Learning the Ways of Things

M. G. JACKSON

The technologies and organisational models deriving from modern science are causing widespread destruction of natural and human systems. This is widely recognised, but only a few people, working individually and in small groups here and there in various fields, have devised alternative ways of doing things that are not violent. Implied in these alternative ways of thinking and doing is an entirely different kind of science, one that sees all things as living beings and as intimately inter-connected. This is the living systems science. Technologies and organisational patterns deriving from this science are gentle, healing and can potentially be continued indefinitely. In this book, the author spells out this living systems science in terms of its basic concepts and operational procedures.

M. G. Jackson is an Indian agricultural scientist who participated in the introduction of Western chemical-based agriculture (the 'green revolution') in India in the 1960s and 70s. He was one of the first to become aware of the fallout from this introduction and attempted to understand the reasons for it. This led him to an examination of the conceptual basis of modern science in general. Along with this he made in-depth studies of traditional agriculture and of the various forms of natural farming that appeared in the 20th century. His other books are Transformative Learning for a New Worldview (2008), A Future for Rural India (2013) and A Return to the Perennial Questions (2013).

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A New Protocol for Science

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In memory of my father and mother

Harry Gordon Jackson (1914-1974)

Janice Jefferson Jackson (1914-1998)

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Preface

Modern science is inherently violent. We are asked to contemplate a world composed solely of material objects pushed and pulled about by forces with mechanical regularity. We human beings are detached observers of this world. This picture of what the world is 'really' like is reflected in the technologies we have created and in the ways in which we have organised our affairs. When these technologies are deployed and organisations established they disrupt and destroy natural and human systems. The evidence of this is painfully evident today: environmental degradation; global heating; armed conflicts over land, water, forests and oil; financial instability; loss of community; and persistent poverty and disease. This scientific worldview brutally suppresses the universal human intuitions of the livingness and inter-connectedness of all things. All attempts to mitigate this violence are to no avail – because the remedies are devised by the same mindset that created the original technologies and organisational models.

The mechanistic worldview that legitimises modern science must therefore change. However, most people, including most scientists, are unable to change their thinking fundamentally. Total global disaster thus seems inevitable.

In this dark landscape the only bright lights are the numerous individuals working singly and in small groups scattered around the world in all walks of life and areas of human interest who have created effective ways of doing things that are not violent, but gentle and healing and which potentially can be continued indefinitely. In order to do this, these people have abandoned the prevailing scientific worldview, adopting, at least implicitly, an alternative worldview. Fortunately these groups are rapidly increasing in numbers and size as their alternative ways appeal to people who have come to see that the status quo is not sustainable. This spread of real alternatives can save us yet.

All these alternative worldviews are found, when articulated, to be similar; that is, they employ the same basic concepts to explain phenomena. They thus collectively constitute a single, common worldview that may be termed the 'living systems' view. In this view all things are living entities, active, perceptive and intelligent – from the smallest to the largest, from the simplest to the most complex. All are systems of parts and are, in turn, parts of larger systems. Living systems are self-defining, self-organising and self-regulating. This book will describe in detail this living systems worldview and show how it translates into ways of thinking about and doing scientific research.

These 'ways of thinking about and doing scientific research' are summarised in what is termed a scientific protocol. A protocol is a formal statement setting forth the general guidelines that are to be followed in formulating a plan for the study of any phenomenon. For example, with the living systems protocol the scientist, in seeking to explain a given phenomena, must not analyse things, but see them in context, that is as parts of the larger systems in which they participate. Such a protocol is not only necessary for the scientist in his or her everyday work, and for the training of young scientists, but for all of us, scientists and non-scientists alike, in whatever our fields of endeavour. This is necessary for the intelligent public oversight of the scientific enterprise and to ensure that the insights and initiatives of everyone can be seen as legitimate contributions to the collective scientific enterprise.

After describing the living systems worldview and its justification in terms of first principles (basic concepts), I will give an example of how a protocol translates into a specific research agenda in the field of agriculture, set forth the guidelines of the new protocol, and show how research programmes in the fields of astronomy, chemistry, evolution and psychotherapy should proceed in accordance with the new protocol.

M. G. Jackson

1

Introduction

A few comments on the terms used in the title of this book will provide a preliminary view of the nature and purposes of the new science that will be described. What actually exists ('actual existents') are not enduring units of material stuff moving about in a world 'out there' - entities that exist even in the absence of an experiencing subject, but experiences. Each experience is a distinct entity, lasting but a moment, and followed immediately by another. What is experienced in an experience is termed a 'thing'. When a similar thing appears repeatedly in a series of such experiences, that thing takes on the semblance of a relatively enduring entity.

This concept is ancient, appearing in Indian Buddhist thought and hinted at by the philosopher Heraclitus in the 5th century BC. In the 20th century the mathematician and philosopher A. N. Whitehead recognised it as a minor strand running through more recent Western philosophical thought and systematically developed it (Whitehead, 1929). In my own work at the beginning of this century I have taken up this same general concept, though developing it differently than Whitehead did (Jackson, 2013 a). The account of the concept in this book follows my version.

Each thing is composed of discrete parts, which are also things, and is at the same time a part of a larger thing. Things are systems of parts. The parts within a thing that appears repeatedly in a series of consecutive experiences are in constant, more or less repetitive motion relative to each other. Systems are thus dynamic, ever-changing entities. They are living beings.

There are four types of things: physical, mental (or thought), emotional and feeling. Feeling things are the feeling that 'I am seeing, hearing, touching (or being touched), smelling, or tasting this or that thing'; such feelings

are always referred to a specific part of 'my' body. Feelings are also passive: 'I feel pain in my left foot'.

Given this concept of actual existents as things, the purpose of science is to describe these things in terms of their roles and functions in the systems of which they are parts.

In our experiences we discern regularities; similar things appear in a series of experiences, giving rise to the feeling that 'a' thing has persisted over time, and the expectation that it will appear in the future. Patterns of activities of things that persist over time also serve as a basis for predictions about future forms and activities. The concept of causality that accounts for the persistence of these forms and patterns of activities is of a single, common unitary causal agency. In the language of modern scientific discourse it is law as immanent in actual existents rather than as imposed on them 'from the outside'. It is immanent in all actual existents, past, present and future. This concept is found in the systems of primary concepts of all the major ancient civilisations (Goldsmith, 1998, chap. 61),[1] and is reappearing spontaneously in contemporary thought as the (so far unstated) rationale for such proposals as the 'implicate order' (Bohm, 1980), 'morphic fields' (Sheldrake, 1988), and 'radical interconnectedness' (Selby, 2002). This concept has been termed 'The Way' by the environmental philosopher Edward Goldsmith (Goldsmith, 1998). The 'ways' of the title refers to the guidance of the Way as it manifests in specific instances; it accounts for the appearance of particular things at particular places and times, the repetitive appearance of similar things in a series of consecutive experiences, and the more or less persistent patterns of interactions among similar types of things over time.

Though a thing disappears from view at the conclusion of an episode of experiencing, it continues to exist in a subtle form in the past. These subtle forms are stored in the archives of the common unitary causal agency (causal agency in short) from where they can be selectively activated in order to contribute to the construction of things in subsequent experiences. The activation of particular subtle forms on a given occasion in the present and the construction of new things is the work of the causal agency. Another

function of the causal agency is to hold and deploy what may be termed 'primordial themes' which account for the essential structures of all things and activities. These are most easily visualised as numbers, ratios of numbers, and their symbolic meanings.

Overall, the agency is not a blueprint or a mere collection of discreet archetypes (like Plato's 'Ideas'), but a living, dynamic, ever-changing configuration of subtle traces of past experiences in interaction with the primordial themes. Nevertheless, every present and future experience is determined down to the last detail. The agency is so vast and complex that we cannot grasp the totality of the influences and their interactions that determine a given experience, and for this reason we cannot infallibly predict the future. Nevertheless, the regularities we can observe, if we do an adequate job of describing them, can serve as the basis for predicting what sort of things are likely to occur in the future, and in what circumstances. In other words, we can learn the specific ways of particular things.

The term 'learning' refers to the process by which we discern the patterns of things and their activities – to the extent that we do discern them. The first stage of this process is the direct appearance of things in experiences. Things are not 'perceived'. They are not 'out there', nor is the experience of things 'in here'. Thus the entire complicated and ultimately inexplicable process of information transfer from 'there' to 'here', and its transformation to an experience 'in here' of what is 'out there', that is assumed today is unnecessary. A thing is known at the same time as it appears. Or we can say that the appearance of a thing and knowing it occur simultaneously. There is no room for error in what is known; whatever is experienced is immediately known totally and accurately. It is a fact, using this word in its usual dictionary meaning of 'that which is indubitably the case'.

Learning, however, is more than simply registering of the appearance of things in experiences. The final stage in the learning process is the dawning of understanding. This occurs when, in a subsequent experience, we are able to place a thing in a specific context. This context is a set of other, prior things integrated on the basis of their essential form or patterns of activity. It is also a thing that appears in experience. It is a thought thing.

When the original thing, or fact, is found to be like those in a particular set, or logically fits with them, we are comfortable with the new experience, and we say that we have understood it. This understanding gives us a basis for anticipating the appearance of specific things in future experiences.

Contexts may be merely a collection of similar things, or a collection of things, physical, mental (or thought), emotional and feeling, that are related in some logical way, or in other words, that form a system. Concepts are systems of related thought things. A neurosis is a system of emotion things and 'the flu' is a system of feeling things. The creation of a new context is possible by the occurrence of a specific insight (intuition, vision, synchronicity [C. G Jung]) which, when suitably interpreted, suggest the contents or form of the context. Insights are themselves things in experiences.

Contexts are of two types. The first is the type that are constructed from previously experienced contexts somewhat modified or by bringing together of existing contexts into new relationships that had not been experienced before (Koestler, 1964). Most scientific work, specifically in the construction of theories, is the result of the creation of new contexts (concepts) of this sort, or of fine-tuning existing concepts. Or, to put the matter somewhat differently, these contexts are built on the basic, foundational concepts that form the collective mindset of the learner's era. The work of Henri Poincare, Dimitri Ivanovitch Mendelev and Albert Einstein are examples of this type of context formulation. The construction of contexts of the second type involves discovering that no viable context is possible using existing primary concepts, and formulating new primary concepts. Aristarchus of Samos, Nicolaus Copernicus, Rene Descartes, Friedrich Kekule, James Lovelock and Rupert Sheldrake are some of the people who have done this.

Before proceeding further it is necessary to define the terms 'primary concepts', 'systems of primary concepts", conceptual basis' (of a given culture) and 'collective mindset' which have been used frequently in this narrative so far. Without clear definitions this entire work could be jeopardised, end up in needless confusion and controversy.

Box 1.1 The perennial questions

The perennial questions are three in number.

1. Who am I?
2. What are the nature of the experiences of that I?
3. What is real?

The answer to the second of these questions consists of answers to the following subordinate questions.

a. What are the actual, ultimate entities which I experience?
b. What is life?
c. What is time?
d. What is space?
e. What is the nature of causation?
f. What is the subject of experiences?
g. What does it mean to come to know something?

Question 2 is satisfactorily answered only when all seven of these subordinated questions are answered. These seven answers and the answers to questions 1 and 3 together make up a complete system of primary concepts in terms of which all experience is sought to be described and understood.

My suggested definitions are the following. Basic, or primary, concepts are the answers to what I term the 'perennial questions' (Jackson, 2013 a). They are perennial in that they seem to have been posed, tacitly or otherwise, in all cultures through the ages. These are listed and elaborated in Box 1.1. The seven sub-questions under question 2, 'what is the nature of experience', may also be termed the seven formative elements of thought. No system of basic concepts will be complete and effective unless a definition is framed for each of these formative elements. These definitions are the primary concepts. Other concepts, if carefully scrutinised, will be found to be derivatives or combinations of these. The most general of these are termed 'secondary concepts'. An example of these in contemporary global culture is 'competition' which derives from the basic concept of

what the subject of an experience is. An example in the new system of primary concepts is the 'living systems' concept which, as already briefly related, is a combination of the primary concepts of 'actual existents', 'life' and 'causation' (answers to sub-questions 2a, b and c). Scientific theories, projects and programmes can usually be seen as deriving their rationale from secondary concepts. They are, however, almost never made explicit. The very existence of primary or basic concepts underlying these secondary concepts is usually not recognised.

A system of primary concepts is a set of answers to all the perennial questions (1, 2 and 3, and the seven sub-questions under question 2). To form a viable system they must not contradict one another, and all taken together must make a coherent whole. Further the system must be effective in describing and explaining all the phenomena that are now before us demanding to be described and explained. 'Coherence' means that the answers to questions 2 a to 2 g must be mutually dependent upon one another. This means that the definition of each one pre-supposes that of each of the others. However, they are not defined in terms of the others. All seven of the answers or definitions 2 a to 2g presuppose the answers to questions 1 and 3.

We will use the list of perennial questions given in Box 1.1 as a guide in analysing and evaluating a given set of primary concepts, our own or that of a previous culture. It will serve as a checklist to ensure that no questions are overlooked. Further, we will follow the rules given in the previous paragraph. These procedures apply not only when considering our inherited system of primary concepts, but also when attempting to formulate an alternative system. This is what is meant by 'working systematically', something that the scientists of the 17th century failed to do and which we, collectively, are at present failing to do today.

A given perennial question may be satisfied by more than one definite answer. For example, question 2a may be satisfied by the material atoms of the Greek atomists and the present-day scientist, by the amorphous 'substance' individuated by the imposition of abstract 'forms' (Aristotle), or by the units of experience themselves of ancient Buddhism, the process

system of A. N. Whitehead and the system of this book. For each of these concepts, the system must assume answers for the other questions that are logically compatible with it and with which it forms a coherent whole.

Answers to three of the seven sub-questions of perennial question 2 have now been sketched. In order to compliment these sketches it will be useful at this point to indicate briefly the answers assumed for the other four. Life is the driving force that brings experiences into existence, one after another, continually. Space is what makes it possible to distinguish parts of a physical thing as distinct individual things in their own right. Space thus comes into operation only within an experience; experiences themselves are not in space. Time has two aspects: one is the appearances of things in a logical sequence; the other the sense of time created in a particular sequence of experiences in which the parts of a thing that appears in those experiences change their positions in a regular way relative to other parts. A person is the subject of an experience which, in an experience, identifies itself with a particular part of a thing in that experience. In the case of a human experience the identification is with the body of a particular *Homo sapiens*.

Finally, there is the term 'protocol'. A protocol is a set of general guidelines for conducting scientific research derived from the system of primary concepts prevailing in a given culture or cultural era. These guidelines are agreed upon by all scientists, and indeed, by all participants in the given system of primary concepts. They may not be fully articulated as definite propositions, but are embodied in the ways particular research projects and programmes are pursued; particular projects and programmes become the models for all research in a given field. Following such models ensures that the results of the research will be accepted as valid scientific knowledge. In common language they follow 'rules of the game'.

It was said a moment ago that protocols are usually not fully articulated, and that scientists look for guidance to particular, model research projects and programmes. However, I think this is a mistake. It is important as far as possible to sit down before any research is begun and clearly articulate

the protocol that will be followed. Model research projects and programmes will then be seen to follow from the protocol, but the scientists looking to these models for guidance in their own work should be aware of the definite reasons why that model is considered a model.

For this reason it is necessary to spell out as clearly and as fully as possible the various items in a protocol. This does not mean, however, specifying the details of experimental design. That would be stifling. The guidelines are stated in only very general terms. What I have in mind is such statements as: 'All things are systems'; 'All systems are organisms'; 'In studying a system, it should not be dismembered or altered by physical or chemical means'; 'A system should be described and understood in terms of its place and function in the larger system of which it is a part, that is, its context, and not in terms of the systems it contains, and for which it is a context'; 'If intervening in a given system is contemplated, such as the conversion of a forest ecosystem into an agricultural ecosystem, it is first necessary to describe the essential structure of the existing system, and then modify it only in ways that do not alter that essential structure.' If a contemplated plan of research goes against any of these general guidelines, the scientist should think again: research carried out according to that plan is unlikely to lead to a correct understanding of what is studied, or to the wholesome application of the results in practice. 'Correct understanding' refers to understanding phenomena in terms of the system of primary concepts from which the protocol is derived - and to which the scientist has, in effect, given his or her prior consent.

The plan of the book may now be indicated. There are four chapters. The first of these is this introduction in which I try to provide a general notion of the nature of the subject matter to be covered. The following three chapters give the substance of my proposal for an alternative science in terms of both concepts and practice.

Chapter 2 describes the process by which knowledge is created. This is done on the basis of the alternative system of primary concepts being described in this book. By the expression 'process of knowledge creation' I mean a logical system of mental operations that leads to knowledge. I

have placed this chapter before those in which the primary concepts of the new science have been described and discussed (Chapter 3) because it is necessary to know what primary concepts are *per se* and how they function in the creation of knowledge. Similarly, it is necessary when studying the primary concepts individually to know first of all what role they play in the process of knowledge generation. The reader will, from the brief preliminary descriptions of these concepts given in this chapter, be able to follow the exposition in Chapter 2. Later, his or her understanding of the structure described in Chapter 2 will be deepened on reading Chapter 3. The structure of the process by which knowledge is generated and the specific concepts used in creating that structure are not independent of each other; each depends upon the other for its rationale.

In describing the process of knowledge creation in Chapter 2 many terms are used which are familiar to scientists today. However, the exact meaning of each of these terms differs significantly, sometimes fundamentally, from those currently recognised. These differences are due to the differing primary concepts of present-day science and science of this book. For example, an 'explanation' of a given phenomena is not a matter of identifying specific causes, but of describing its place and function in the larger system of which it is a part. A thing is what it is because it is where it is. This may be termed a proximate explanation. A final explanation is the causal agency. It is one and the same for all things.

Chapter 3 is devoted to an exposition of the primary concepts (specific answers to the perennial questions) that underpin my view of science. In order to do this systematically, the perennial questions format has been used. Concurrently with this, the analogous primary concepts of present-day science will be articulated and critiqued. In doing this the faulty logic of these latter concepts will be exposed, and also the lack of coherence among them. By the term 'present-day concepts' I mean both those that took shape during the first half of the 17th century in Europe and are the mainstay of present mainstream scientific practice.

Also in Chapter 3 the efforts of physicists over the past century to re-define the nature of ultimate actual existents and of causation will be

reviewed briefly. These efforts have not yet achieved definite results. Equally, attention will be given to the efforts of biologists and sociologists to break out of the present protocol prescribed by present-day mainstream physical sciences. So far they, like the physicists and chemists, have been unable to free themselves entirely from the primary concepts of Enlightenment science. Finally, special attention will be given to the need to address the question of what life is in itself, a question completely ignored by everyone so far. Overall, I hope to make it clear how we can learn from the mistakes of those who have gone before. These mistakes include insights that were misinterpreted and lines of reasoning that went astray. Of course, they were unaware of these mistakes. They have become evident to us by hindsight only recently as we began to enquire what has gone wrong with the Enlightenment worldview and why. And further, by doing this I hope to convey a sense of how great is the responsibility of all of us today who are attempting to chart a new course.

Chapter 4 is devoted to the derivation of a new scientific protocol from the primary concepts articulated in Chapter 3 and from the process of knowledge creation described in Chapter 2. The implications of this new protocol for practice and for the types of technological interventions in natural and human systems that are expected to result will be explained. An attempt has been made to formulate one protocol that will cover scientific enquiry in all areas; one of the tragedies of Enlightenment science has been the attempt to impose the narrow protocol for physics on all other disciplines, stifling and warping their development. A clearly and simply articulated, broad-based general protocol will also help those who are not professional scientists understand what scientists do and why they do it, which is so necessary for the public oversight of the scientific enterprise. It should also go some way to showing how every person is – must be – a scientist in his or her own life situation.

Note

1. The Indian Vedic version, termed *Rta*, is a particularly well-articulated version of this concept (see Miller, 1985; Pande, 1990).

2

The Creation of Knowledge

The purpose of this chapter is to describe the process of creating new knowledge from the standpoint of the alternative system of primary concepts being presented in this book. The many ways in which this process differs from that which is current today will become evident as we proceed. However, three of the most general differences may usefully be mentioned at the outset. The first is that the knowledge created by 'scientific' enquiry is no different in kind from that created in the course of our everyday lives. The former is simply a more conscious and sophisticated version of the latter. The scientist is usually more conscious of the separate operations in the process when in his or her laboratory than when he or she is not at work. Further, the scientist may use instruments like microscopes, telescopes and earth satellites that lead to the appearance of things that are not experienced in the ordinary course of life, thus enlarging the pool of facts with which to work. To emphasise the essential similarity of scientific and ordinary knowledge generation, the title of this chapter does not contain the word 'scientific'. No distinction will be made between the two from now on.

Second, there is no difference in the purpose for which scientific and ordinary knowledge is created. That purpose is simply to enable us to gain an understanding of why things and events (the interactions of things over time) are as they are, and from this understanding to organise individual and collective life in ways that do not destroy or unduly disturb the natural flow of events. The purpose is entirely utilitarian. In saying this I am not ignoring or devaluing the thrill and the satisfaction of discovery, but only pointing out that these are not the primary end we have in view when we endeavour to create new knowledge. As for the definition here offered for the purpose of knowledge generation, it also flows from the new system of

primary concepts described in this book. The present-day view that the purpose of scientific research is to gain power - over things, including people, and events - is, from this point of view, an aberration. The justification for this way of thinking comes from the dysfunctional system of primary concepts inherited from the European Enlightenment.

Continuing our discussion of purpose, a third important difference needs to be mentioned. Today one often hears and reads the statement 'the purpose of science is to discover the truth', or the question 'is this theory true'. What is implied in this pre-occupation with 'truth' is that there are certain patterns of events that are unchanging. But from the standpoint of the definition of causation assumed here there is nothing that remains absolutely constant over time. Unlike the eternal, ideal forms (the 'Ideas') of Plato, or the eternal, immutable 'laws of nature' of present-day scientists and philosophers of science, the view here being suggested is of the constantly shifting configuration of the causal agency. This agency does contain 'primordial themes', but these are not the sole or direct determinants of new experiences. Further, these themes are continuously modified as they participate in the flux of the totality of old and newly-added subtle traces of experiences that once appeared in the 'now' of immediate experience. (1) In view of this, knowledge can only be tentative, given the limited collection of experiences from which, in any particular instance, it is derived. Knowledge can never be 'true': it may be useful in helping us to understand things and their interactions, but can lose its usefulness over time

To structure the following description of the process of knowledge creation, the accompanying diagrammatic representation will be useful (Figure 2.1). The solid lines indicate that the completion of a given stage in the process leads logically to the next stage, or that it sends feedback to previous stages. The dashed lines represent a subtle signal from a particular stage back to a prior stage that further, more appropriate inputs are required. Each stage in the process and the ways the stages are interrelated will be described and discussed.

The process of knowledge creation is essentially circular with the end result, the successful testing of contexts (or explanations), feeding back

into the sub-process of context formation and sometimes even to the process of the formulation of a new system of primary concepts.

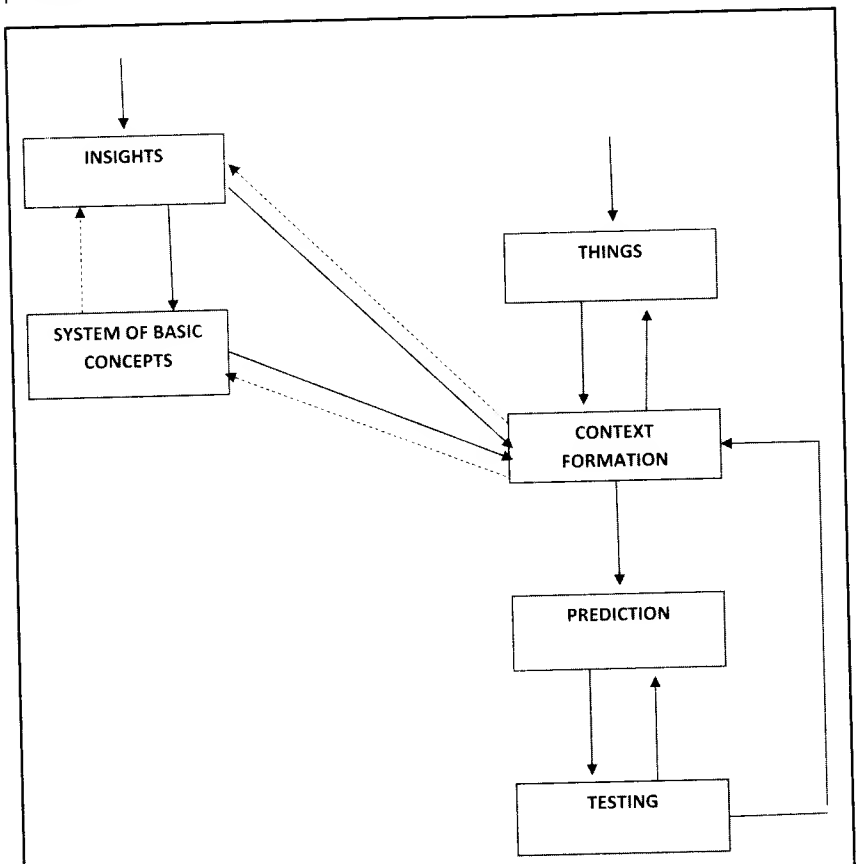

Figure 2.1 A diagrammatic representation of the process of knowledge creation

One further observation is necessary before we proceed. The feedback from 'Testing' either strengthens or weakens the context on which the prediction leading to the testing stage was based. If the result of testing seriously weakens the context, and if at the same time other possible contexts are also weakened by negative feedback, it may be necessary to return to the system of primary concepts; these concepts may need to be modified or entirely replaced. However, this perpetuation of the negative

feedback to the stage of primary concepts occurs very rarely, usually only at the end of a cultural era. Negative feedback during a given cultural era is accommodated by modification or replacement of contexts within the same framework of the prevailing system of primary concepts. When a new system of primary concepts replaces an existing one, the result is an entirely different sort of knowledge. And maybe an entirely different conception of the process of knowledge creation itself comes into being.

2.1 Systems of primary concepts

A basic concept is a proposition which is derived from insight. The term 'proposition', is a statement that expresses a preference for a particular way of looking at things, of 'making sense' of them. Together, all these concepts make a complete system which determine the habitual and accepted way of thinking in a given culture or cultural era.

A system is, in this case, a number of conceptual things (concepts) working together through a network of logical connections. This system, like all systems, is a dynamic living entity. In the terminology of this book a system is itself a thing and the individual concepts are parts of it. A part is described and explained in terms of its place and function in the system of which it is a part. Viewed in isolation from the system it has no meaning; it does not then exist in any meaningful way.

There are five requirements which a system of primary concepts, or collective mindset, must meet if it is to be viable: it must be logical, coherent, complete, adequate and believable. The term 'logical' means that a basic concept must not contradict itself nor contradict other primary concepts in the system in which it operates. This can be illustrated by an instance where this requirement has not been met. This instance is the definition of the subject of an experience in the system of primary concepts that informs science and society in general in contemporary global culture. The subject of an experience is said to be a person, that is, in the last analysis, a material structure, one among many structures of various types. At the same time this person is also said to be a 'detached observer' of material structures, including the structure he or she considers himself or herself to be. In other words, an entity composed of insentient material particles,

a human body, is said to have the ability to cognise other material particles, including those that constitute its own body. Cognition implies sentience, and so it is, in effect, being said that material particles are both insentient and sentient. In a feeble attempt to overcome this contradiction it is said that the power of cognition, that is, a mind, spontaneously emerges from complex material structures. What this mind is, in itself, and how it emerges is not explained.

Another example of logical inconsistency in our present-day system occurs between the concepts of strict determinism, a definition of causality (answer to question 2 e, Box 1.1), and free will, an attribute of the subject of experiencing (a person) (answer to question 2 f). About this Whitehead has said:

> ...Western peoples exhibit two attitudes [that] are really inconsistent.... A scientific realism, based upon mechanism, is conjoined with an unwavering belief in the world of men and higher animals as being composed of self-determining organisms. This radical inconsistency at the base of modern thought accounts for much that is half-hearted and wavering in our civilisation.
>
> (Whitehead, 1925, p. 76)

In this comment he also points out the consequences of failure to ensure logical consistency in a system of primary concepts.

The second requirement is for coherence. I quote here Whitehead's definition.

> 'Coherence'...means that the fundamental ideas...presuppose each other so that in isolation they are meaningless. This requirement does not mean that they are definable in terms of each other; it means that what is indefinable in one such notion cannot be abstracted from its relevance to the other notions.
>
> (Whitehead, 1929, p. 3)

If we do not acknowledge this our thinking about and dealing with phenomena is apt to be confused and lead to problematic outcomes in practice.

An example of this mutual dependence of primary concepts for their definition is that of physical things and space. We cannot conceive of

many physical things in the absence of space; there must be an interval of empty space between two physical things for us to know that there are two things. Also, we know there is a thing only because it occupies a volume of space. But in the absence of any physical things, we can have no conception of space; about empty space we cannot say anything.

The system we have inherited from the Enlightenment is highly incoherent. The four primary concepts about actual existents, time, space and the subject of experiencing are entirely stand-alone concepts, none of them dependent on any of the others in any way for its definition. This is clear from Newton's *Scholium* to his eight definitions at the beginning of his Principia.

> Hitherto I have laid down the definitions of such words as are less known, and explained the sense in which I would have them to be understood in the following discourse. I do not define time, space, place and motion, as being well known to all. Only I must observe, that the vulgar conceive those quantities under no other notions but from the relation they bear to sensible objects. And thence arise certain prejudices for the removing of which, it will be convenient to distinguish them into absolute and relative, true and apparent, mathematical and common.
>
> I. Absolute, true, and mathematical time, of itself, and from its own nature, flows equably without regard to anything external, and by another name is called duration: relative, apparent, and common time, is some sensible and external (whether accurate or unequable) measure of duration by the means of motion, which is commonly used instead of true time; such as an hour, a day, a month, a year.
>
> II. Absolute space, in its own nature, and without regard to anything external, remains always similar and immovable. Relative space is some movable dimension or measure of the absolute spaces; which our senses determine by its position to bodies, and which is vulgarly taken for immovable space;...absolute and relative space are the same in figure and magnitude; but they do not remain always numerically the same.[2]

The key phrase here in defining absolute time and space is 'without regard to anything external.' The definitions of actual existents and of the subject that he implicitly assumed (material entities and persons) were already parts of scientific thought of the time. In their most abstract formulation they are Descartes 'matter' and 'mind', which he (Descartes) insisted were completely independent of each other.

In addition to mutual dependence for their definitions among all the primary concepts of a system, there is another requirement that also must be met to ensure coherence. It is necessary that all these concepts be seen as dependent on, or deriving from, a single mega-concept. In the system being developed here, a restriction is placed on what that concept must be. It must be real; or in other words, it will be our answer to the third of the perennial questions. This answer will be described in section 3.2. In the materialist, mechanistic system as finalised in essence by Newton, it could be said that the mega-concept was the Christian conception of God who created all manifest existence and laid down the laws by which it is organised and controlled. This was Newton's thinking and that of most people over the next two centuries or so. But this concept is no longer held by many people. As a result the original Enlightenment system has become still more incoherent with time; the modern system of primary concepts seems even more like a rag bag of concepts picked up from here and there than a system.

The need for coherence to ensure an effective system makes it clear why, at times when an existing system has become as dysfunctional as ours has today, it is necessary to discard it in one go. Metaphorically speaking, the dilapidated structure on a building site must be razed and the ground cleared before the work on a new structure can be started. The attempt to replace a dysfunctional system piecemeal, changing a few concepts but not all, can only compound the existing confusion and uncertainty.

The third demand is that a system must be complete. A complete system is one that formulates an explicit concept in answer to every one of the perennial questions. Any system that overlooks or ignores any of these questions will be defective, and dysfunctional. It will have a blank or a hole

in it that will lead to problems in practice. In the Enlightenment system of primary concepts, for example, there is no answer to the question what life is. Enlightenment scientists banished the concept of life altogether from their thought when they decided that planets were no longer to be thought of as living beings, but only 'dead' material structures. From then on, even what we call living beings were thought of as mere machines. It is difficult to estimate the damage that this oversight has done.

The question, what is life, cannot, of course, be ignored in the long run. And so when it must be addressed from the materialist, mechanistic viewpoint the answer is sought in experience itself. In other words, it is thought to be a fact that can be discovered in experience. This is quite impossible. Satisfactory answers to the perennial questions can never be found in the facts of experience. Attempts to do so in the case of life have none-the-less been made. Until a few decades ago, and certainly in mid-20th century when I was in school and at University, everyone seemed to be satisfied with the following 'definition'. The behavioural traits of material structures that were said to be 'living' were enumerated: 'this structure is alive because it displays the properties a, b, c....' If it was further asked, 'why does this structure of material particles display these properties a, b, c...,' the reply was, 'because it is alive.' Later in the 20th century it began to be said that life is an 'emergent property' of certain complex configurations of material particles. But this is really only an example of naming something which one cannot define. What life is in itself must be stated as a definite concept, analogous to the one we make about actual existents, and it must be formulated prior to undertaking scientific research. The failure to do this leads to confused thinking in practice, as for example the misconceived search for the 'origins of life'. More importantly, it has led to a pervasive, unthinking devaluation of, and violence towards, all living beings.

In constructing a new system of primary concepts it is essential to have a checklist before us to ensure that the system is complete. A list of the perennial questions will serve this purpose. The system we construct must answer every one of these questions. In this way the dimensions of the task before us is clear at the outset, and we will not overlook any concept that is essential to a complete system.

A checklist is equally important in conducting a critique of an existing system. When an existing system becomes dysfunctional and must be replaced, it is necessary to examine it as a whole and also each one of its component concepts against the requirements described in this section. Doing this, we become aware of the mistakes that we must avoid in formulating a new system to replace it.

Another problem is that if we do not have a checklist before us as we begin to construct a new system we may fail to identify one or more of our own current concepts and thus carry them over unconsciously into our work of creating a new system, thus distorting it. In fact, we continue to participate in the existing system, our claim to recognise its defects notwithstanding.[3]

Next in our list is the demand that a system be adequate. It should be possible, using the system, to describe and explain all the facts (things and the activities of things) appearing in contemporary human experience. This is an ideal that must be aimed at in constructing a new system. Even if a system is reasonably adequate when formulated it is likely to become less so with time as new facts appear. Dissatisfaction with a system in respect of its adequacy then increases, and may in time reach a point where it becomes clear to most people that it needs to be replaced altogether. Of course, before that point is reached attempts at piecemeal replacement of individual primary concepts will be made. We are at this stage today in dealing with our inherited Enlightenment system. As suggested earlier, this is unlikely to succeed.

From the second half of the 19th century onwards the inadequacy of the Enlightenment system has become increasingly clear. This system was developed by scientists who focused exclusively on the nature of physical things and processes. They also displayed a very casual attitude to defining the nature of the subject of experiencing, and neglected defining life altogether. It is not surprising, therefore, that in the areas of biology, sociology and psychology the Enlightenment system has proved inadequate. It imposed ways of thinking that stifled the growth of knowledge in these fields; it forced scientists to formulate unsuitable contexts and explanations for the facts they studied. A few courageous scientists simply abandoned

the primary concepts of the prevailing system when describing and explaining their findings. Albert Howard is an example of a scientist who did this comprehensively.

Further, the founders of the Enlightenment system recognised only those causal relationships that could be quantified and described mathematically. Given our very limited capacity to handle the complexity of most structures in this way, a large number of phenomena could not be described at all - and consequently were said to occur by chance. Charles Darwin reluctantly acquiesced in the notion of chance when he developed his theory of the evolution of plants and animals. He rightly remarked: 'Not that this notion [of chance] at all satisfies me, I feel most deeply that the whole subject is too profound for the human intellect (Stone, 1982, p. 642).' Later, at the beginning of the 20th century when physicists were unable to trace causal relationships in the sub-atomic realm in the prescribed way, they also resorted to the notion of chance, though not reluctantly. The mathematical techniques developed later in the century, combined with the greatly increased computational capacity that also became available, suggest that this conclusion was premature. Einstein refused to acquiesce in the notion of chance. He maintained that '...the theories which invoked indeterminacy were forced to do so only because of man's ignorance (Clark, 1984, pp. 423-4).'

These stories point to two important aspects of the requirement that a system of primary concepts must be adequate. First, the area of experience in which the new system is seen to apply must be as wide as possible. At the very least, it should be tested in respect of all kinds of things: physical, mental, emotional and feeling. Second, the individual concepts must be framed in terms of the utmost possible generality. This will minimise the instances where a concept is unable to deal with facts that are discovered after the system is formulated. If the concept of determinism had originally been framed so as to cover all classes of physical phenomena, whether they were susceptible to scientific study or not, later generations of physicists would not have had to conclude that interactions of sub-atomic particles occur by chance.

This completes the discussion of the requirement for adequacy, except for noting that any system that is illogical or incoherent is also likely to be inadequate.

This brings us to the fifth requirement, namely that a system must be believable. The Enlightenment system of primary concepts was unbelievable, even at the time it was formulated. Even Newton himself did not believe in all the concepts that he formulated in the *Principia.* This should have caused him to hesitate and reconsider.

First there was the concept of force. Following Johannes Kepler's lead, Newton discarded the concept that physical things are organisms. This was a shared concept in all cultures up to that time. It is a simple, elegant and complete explanation of why the parts of a system move in the regular and more or less repetitive ways that they do. The part being itself an organism has the ability to move itself, and it knows its specific role in the system of which it is a part, and also that it must conform to that role. This way of thinking was applied to the solar system and to all terrestrial systems.[4] The work of the astronomer until the 17th century was simply to describe the solar system. In that century an alternative way of explaining why the parts of things move as they do began to be formulated. Kepler pictured the Sun as wielding a gigantic broom to sweep the planets around itself (Koestler, 1959, p. 343). Newton adopted the twin concepts of perpetual motion and of force (his first law of motion).

The concept of perpetual motion, as applied to 'dead' material objects, is so contrary to ordinary everyday experience as to be completely unbelievable. Galileo and Newton banished the concept of self-motion by organisms but seemingly the bare notion of self-motion refused to be banished. Perhaps there is no other way to think about the phenomenon of motion. For why else should this very concept have reappeared in the guise of perpetual motion? The problem is that when it thus reappeared it was minus its specific explanatory context of an organism, or any other context. Without that context, or any other, it does not 'make sense' - it is unbelievable.

The concept of force is also difficult to believe, in addition to being logically untenable. Concerning the former, Koestler quotes from a letter

written by Newton in which he admits that he himself cannot believe it (Koestler, 1959, p. 344). His problem was that he could not conceive of how a force generated by one physical body could act across empty space to affect the behaviour of another. Nor has anyone else since done so satisfactorily. Newton left the problem, as he frankly says, for others to solve. Those who followed him over the next two centuries or so created the concept of an insubstantial 'something' that fills all space not occupied by physical bodies and transmits forces. It was termed the ether. In the 20th century the ether was replaced by fields, which allows scientists to do their calculations, but which is no less mysterious than the ether. Non-scientists have never had any trouble with the concept of empty space.

Seemingly, it was a mistake to discard the concept of organism. Further developments seem to confirm that it was, for the story is far from over. The concept of organism was not banished; it went underground. From there it has made repeated brief appearances again and again over the ensuing three centuries in scientific and other contexts. Or, like the hardy 'weed' that is cut back repeatedly, even to ground level, it refused to die. In the last three decades of the 20th century it has reappeared unexpectedly and is growing and gaining strength daily. When ecologists today speak of ecosystems, they say that the individual organism, plant, animal, fungi or microbe, is to be defined, in the first place, in terms of its place and function in the system of which it is a part. It behaves in the way it does in order to ensure the integrity and smooth functioning of the system. The individual organism at its own level is also a system of parts, that is, organs that are in turn defined in terms of their place and function in the organism. And so on, down the scale of decreasing complexity - and up the scale of increasing complexity. The so-called 'hard' version of the Gaia theory sees the planet Earth as a living entity, no different in essence from any of those entities we presently term organisms. This version of the Gaia theory resonates enormously with many people, including some scientists. Indeed, some scientists are even trying to create a rationale for it in terms of primary concepts, but with only limited success so far. To succeed an entirely new system of primary concepts will have to be created, for the Gaia theory challenges all of our present concepts. This is a challenge that even those scientists who feel that the Gaia theory is 'right' (that is, believable) do not seem to be aware of.

Newton's definitions of absolute space and time (see pp. 34-5) are also difficult to believe. Or perhaps I should say that it is simply impossible to conceive of space and time in abstraction from things and events. Things can only be said to be 'here' or 'there' in relation to other things (parts within things); events can only be said to come 'before' or 'after' other events. This is the way, as Newton says, that 'vulgar' men and women understand them. It is also the way philosophers understand them (see Whitehead, 1929, p. 70). And it is the way they will be understood in the system being described here. These are two further examples of hardy perennial concepts that cannot be permanently suppressed.

2.2 Insights

This section is devoted to describing the nature of insights, their various types, how they are used in constructing contexts and primary concepts, and the problems encountered in so using them. The problems are those of interpretation. Inappropriate interpretations lead to faulty concepts. This is illustrated by the many interpretations made in the past that we now recognise as inappropriate. I will relate a number of actual instances of this. And finally, I will relate an insight of my own and how I have interpreted it; this insight is central to the overall system of primary concepts being described in this book.

Before doing all this, however, it will be necessary to consider in some detail the role of insights in the overall process of knowledge creation. At the beginning of this chapter it was shown how this process is essentially circular, with results of the testing stage feeding back into those of context formation and the formulation of primary concepts (Figure 2.1). There is, however, another sort of circularity at a more fundamental level. Recognising this and understanding it rightly is essential to our entire project of creating a new science.

2.2.1 The role of insight in the creation of knowledge

The things that appear in waking experience (box at the upper right in Figure 2.1) are directly known by the subject of those experiences. They are known as they are, instantly and entirely. They are facts. But facts in

themselves are meaningless. They acquire meaning only when they are placed in specific contexts. By doing this they are understood. The creation of these contexts and the placement of facts in them are done in terms of the system of primary concepts employed. The concepts are created independently of the facts which they explain; they are based on insights.

If we ask ourselves what the source of our facts is, why they are as they are, and why they appear at all, we find that we do not know. The best we can do is to construct likely answers in terms of our particular system of primary concepts. In terms of the new system being developed here, for example, we say that the source is the past; the things that appear are derived from the subtle traces of the forms of experiences (karmic seeds) in the past that are stored in the archives of the causal agency. A selection of these seeds is fashioned into a new thing, for the most part like some particular previous thing, but also different; each new thing is thus unique. It is fashioned by the necessities of the present configuration of the causal agency. These new things are carried into manifest existence by the out-flowing current of life.

Insights also appear spontaneously and they are also facts, only of a different kind than those of ordinary waking experience. We cannot say why they appear, why they are as they are, and where they come from. Again, the best we can do is to develop a set of answers in terms of the system of primary concepts we have devised. The system of primary concepts is, of course, the same one that we deploy in answering these very questions in respect of the facts of waking experience. Thus we will say that the insights that we receive are glimpses of the primordial themes that operate in the causal agency, themes that are not visible in the phenomena they inform (the facts of waking experience and the contexts created to understand them). These insights occur in order to facilitate the actualisation of the current configuration of the causal agency.

The conclusion from all this is obvious. We are explaining why insights appear, why they appear as they do, and where they come from in terms of the concepts created on the basis of these very same insights. In other words, the process of knowledge creation, as depicted in Figure 2.1, is completely circular; there is absolutely no independent reference point

outside this circular structure that we can point to and say; because this is certain, our system of primary concepts is certain, or true. Our system, any system, is, as Plato's Timaeus said, nothing more than a 'likely story'. It is important to acknowledge this.

Not only do we need to acknowledge this conclusion, but to reflect on it as well. When we do so, it becomes clear that the process of knowledge creation has no beginning and no end; it begins at the end, and ends at the beginning. We can also say, as it were, that all experiencing and the understanding of experience (which is also experiencing) is confined within a circle. Our knowing cannot go outside this circle; when it reaches the boundary on any side, it is forced back upon itself. A symbolic representation of this idea of a circle has actually appeared in insights in all cultures in all ages, that of the *ouroboros*, the snake grasping its own tail. (In Chinese culture it is a dragon.)

The image of a circle has purposely been invoked because it reveals another important aspect of our knowing. Drawing a circle creates an inside and an outside. In this case, what is inside is what is known or at least knowable. What, if anything, is outside the circle we do not know and cannot know. For all practical purposes there is nothing outside. This idea of the 'nothing', will receive further attention later in Section 3.2; it is an essential, and indeed, inescapable context for understanding experience.

2.2.2 The nature of insights

Insights are always a surprise; they are sudden and unexpected and cannot be accounted for in terms of any preceding train of logically-ordered experiences that occurred in the waking state. And yet, they are relevant to some such train, though in ways that could not have been anticipated. They suggest the framework for a basic concept, or a context for a fact or group of facts of waking experience for which no context could be found earlier. After their appearance it is impossible to say how they were formed. At present they are said to be the outcome of 'unconscious', 'alogical' thought processes, but this explanation is unintelligible in the absence of a clear-cut definition of the term 'mind' which is said to have 'conscious' and 'unconscious' aspects – a concept which does not feature in our

system of primary concepts. In this book insights are exactly what the name implies, a glimpse of what lies under the surface of phenomena. Specifically, it is a view of some one or more of the abstract organising principles or primordial themes that are inherent in the causal agency. Making this/ these particular themes known is necessary to the actualisation of the current configuration of the causal agency in the totality of immediately succeeding experiences.

Insights appear in a variety of ways. Some are physical things, where the things are used symbolically. These are termed visions. They are not single experiences but logically-ordered sequences of similar experiences, and often an emotional thing is interpolated in the sequence to heighten the effect of the physical thing. Other insights occur as mental or feeling things. Some thought, emotional and feeling things are formless. These are termed intuitions. They only acquire form in subsequent experiences. An example of the latter is when a writer suddenly becomes aware that there is a definite idea that requires to be articulated. At this point it is formless, and the writer cannot anticipate what specific form it will take. He or she only knows that the new idea will be relevant to the situation in which he or she finds himself or herself, and necessary for an understanding of that situation. He or she simply starts writing and as he or she proceeds, the idea begins to take shape (usually with a lot of erasing and rewriting). When the idea has finally been described fully, there is a feeling of 'rightness' about it. It seems so obvious. Albert Einstein was once quoted as saying: 'I rarely think in words at all. A thought comes, and I may try to express it in words afterwards (Hawking, 2002, p 1162).'

Some insights are difficult to categorise in this way, such as spoken or unspoken words (see Box 2.1) or musical scores.

Insights may also be classified according to when they occur. Intuitions appear during the waking state, while visions appear in the waking state as well as in dreams. While they sometimes appear in the waking state, they are nevertheless different from the things that ordinarily appear in waking experiences. Other insights occur during the transition period between sleeping and waking which are termed hypnopomic visions, or during the transition period between waking and sleeping which are termed hypnogogic

Box 2.1 Words as insights

Some insights occur as words. These usually appear in a vision; they are not seen written out or spoken. The recipient is usually quite certain of their spelling and can write them out in the script of whatever language he or she knows. The meaning can then be pondered afterwards. They are classed as visions because they are formed; that is, they appear as words. The words are used symbolically. This last statement needs an explanation.

Words, spoken or written, are symbols. They direct our attention to something other than themselves. In themselves – as sounds or marks on paper – they are meaningless. Their meaning is in the thing they point to. In ordinary waking experience. When used in speech or writing, a word points to only one thing: it has a single, fixed meaning. This is necessary for logical thinking and effective human discourse. The words used in vision, however, do not have a fixed meaning. Their meaning varies with the context in which they are used, and they can be seen as relevant to more than one context. All the possible contexts we can think of do not exhaust their meaning. Like all symbols, they point to multiple contexts, and ultimately to something that is indefinable.

There are a number of indicators that a word received in vision is to be understood symbolically. In the first place the word may be one that the recipient has never heard of before. The dictionary (fixed mode) meaning does not seem literally relevant to his or her present waking life experience. Or, the word in the dictionary is spelled slightly differently than he or she has spelled it. Or, the word is archaic and so not found in current dictionaries. (If the language is English, then the word might be found in the complete version of the Oxford English Dictionary.) Often the word received is in a language the recipient does not know, and the help of a dictionary of that language is needed – or the help of a person who speaks that language. Sometimes too, a word may be a hybrid of two or more known words with very different fixed meanings. Occasionally a short phrase is received that does not make sense logically, but a little pondering may reveal its symbolic meaning or meanings for the recipient.

In writing this box I have summarised my own encounters with vision words. These words have invariably come to me in hypnopomic visions (see page 38 for the definition of hypnopompic vision).

visions. Waking visions are imposed on waking experience, or occur during the practice of 'creative imagination'.(5)

Two other types of experiences can also be considered insights. One is synchronicities (as they were named by C. G. Jung) in which two events occurring to a person in seemingly unrelated contexts when considered together are seen to convey a message. Precognitive dreams present a scene that will later appear in waking experience. Both these are considered insights because they show us that there are 'inner' connections among seemingly unrelated experiences and among those occurring at different times, past, present and future. In due course I will endeavour to show that with a proper 'story' (system of primary concepts) these phenomena can be seen as intelligible.

The occurrence of insights of all types in all areas of human interest has been extensively documented. Scientists are challenged to construct contexts for new facts that have come to light as a result of their research. When they succeed in meeting this challenge, it is usually with the help of insight. The mathematician Henri Poincare, for example, explains how he created Fuchsian functions.

> For fifteen days I strove to prove that there could not be any functions like those I have since called Fuchsian functions. I was then very ignorant; every day I seated myself at my work table, stayed there an hour or two, tried a great number of combinations, and reached no results. One evening, contrary to my custom, I drank black coffee and could not sleep. Ideas rose in crowds; I felt them collide until pairs interlocked, so to speak, making a stable combination. By the next morning I had established the existence of a class of Fuchsian functions, those which come from the hypergeometric series; I had only to write out the results, which took but a few hours.
>
> (Koestler, 1964, p. 115)

He goes on to describe how he subsequently further developed these functions, similarly guided by intuition. On one such occasion he explains:

> Then I turned my attention to the study of some arithmetical questions apparently without much success and without a suspicion of any connection with my preceding researches. Disgusted with my failure, I went to spend a few days at the seaside, and thought of something else. One morning, walking on the bluff, the idea came to me, with just the same characteristics of brevity, suddenness, and immediate certainty, that the arithmetical transformations of indeterminate ternary quadratic forms were identical with those of non-Euclidean geometry. Returned to Caen, I meditated on this result and deduced the consequences. The example of quadratic forms showed me that there were Fuchsian groups other than those corresponding to the hyper-geometric series....
>
> (Ibid., pp. 115-16)

Jacques Hadamard, Andre Marie Ampere and Karl Friedrich Gauss have reported similar instances of intuition in their work (Ibid., pp. 116-18).

A notable feature of these intuitions, mentioned in the first quote of Poincare above, is the conjunction of existing contexts seen as separate till then to form larger structures. In all cases the intuition only occurs after the scientist has struggled unsuccessfully with a problem.

Examples of vision playing the decisive role in the work of scientists are also numerous. A few of the most prominent are those of Friedrich August Kekule (the ring structure of the benzene molecule), Albert Einstein (relativity), Niels Bohr (the planetary model of the atom), and Dmitri Mendeleev (the periodic table of chemical elements). In all these cases the scientists themselves have described their visions (see, Koestler, 1964; Stevens, 1995; Tandan, 2008). It is likely that Pythagoras came to the concept of numbers and the ratios of numbers as the basis of form as a result of a vision, and that Plato also came to the concept of his 'Ideas' as a result of a vision. I will describe the vision of Kekule in some detail to illustrate the nature of visions in general and their interpretation.

Kekule was unable to devise a successful model of the structure of the benzene molecule. He wrestled with the problem, but without result.. Then he had the following vision.

> ...I was sitting writing on my textbook, but the work did not progress; my thoughts were elsewhere. I turned my chair to the fire and dozed. Again the atoms were gambolling before my eyes. This time the smaller groups kept modestly in the background. My mental eye, rendered more acute by the repeated visions of the kind, could now also distinguish larger structures of manifold conformation; long rows sometimes more closely fitted together all turning and twisting in snake-like motion. But look! What was that? One of the snakes had seized hold of its own tail, and the form whirled mockingly before my eyes. As if by a flash of lightening I awoke; and...I spent the rest of the night working out the consequences of the hypothesis. (http://www.woodrow.org/teachers/chemistry/institutes/1992/Kekule.html. Consulted on 25th October 2007)

He interpreted this dream image as suggesting a circular structure for the benzene molecule.

This vision also illustrates the possibility of interpreting visions in more than one way, and it is to this that we will now turn our attention.

2.2.3 Levels of interpretation

One interpretation of Kekule's vision is the one that he in fact made. It was the one that was of immediate professional concern to him, which is undoubtedly the reason it occurred to him. In his pre-occupation with this concern he was perhaps unaware of other possible interpretations. It is my own experience that every insight can be interpreted in more than one way, and that each of these ways can be seen as applying to the individual receiving the insight at the particular time and in the particular situation in which he or she does receive it. Perhaps all the possible interpretations of a particular insight cannot be visualised, or their connection with the immediate circumstances in which it occurred cannot be made. But this will probably be due to the limitations of the interpreter. The universal nature of the symbol employed in Kekule's vision, the snake grasping its tail in its mouth, the oroborous referred to briefly earlier, clearly suggests that the vision was meant to address other concerns as well. In addition to the meaning ascribed to this symbol earlier, namely circularity, it can also be

said to symbolise wholeness, and also the 'beyond', or the 'nothing'. I would like to explore these other possible meanings. There is no evidence in the accounts we have that Kekule was aware of these and so I will speak of them in general terms only.

Before proceeding, however, it will be useful to categorise the possible types of interpretation. There are three types or levels; 'personal', 'transpersonal' and 'impersonal'. A personal interpretation is one that addresses a concern of one person only. A transpersonal interpretation is one that addresses a concern that is common to all the participants in a given cultural group, that is, a concern relating to the 'story' assumed by that group. Or, it may address a concern of a specific sub-group of individuals within the culture, such as, for example, the scientists belonging to a particular discipline. An 'impersonal' interpretation is one that is seen as pointing to what is beyond all knowing, the 'nothingness'.

Kekule's interpretation falls into the transpersonal category in as much as scientific work is always the joint endeavour of many individuals. Another possible transpersonal interpretation, also professional, is that the vision was suggesting an alternative concept of actual existents to that of lifeless material entities – that is, that they are self-organising living beings.

Another possible interpretation of Kekule's vision has to do with the ouroboros as a symbol of wholeness. This would be an interpretation of a personal kind – personal wholeness. Modern systems of psychotherapy all deal with this subject, insisting that achieving wholeness is a fundamental human need. In the terminology of this book, wholeness is achieved by the integration and thus harmonising of the diverse types of experiences - physical, mental, emotional and feeling things – that together define a person as an individual. This vision of the ouroboros might have been suggesting that Kekule become aware of this need in himself and to work towards meeting it. Or, more happily, it could have been an acknowledgement of work done or at least of progress towards meeting it.

This wholeness of a person is extremely important in relation to the work of constructing primary concepts and contexts for the ordinary facts of waking and dreaming. Insights that come to a markedly unintegrated

and inharmonious person are likely to be, in the first instance, those that highlight this condition. In such cases, therefore, a personal interpretation should be given priority over the transpersonal or impersonal. This will be self-evident to an experienced interpreter. As a general rule, one should as a matter of course always consider the personal interpretation of any insight, and to act on that interpretation, before going on to look at possible transpersonal and impersonal interpretations. In ancient India learning one's trade as a philosopher or scientist also required one to achieve personal wholeness (see Radhakrishnan, 1923, volume I, pp. 44-6).

The third way of interpreting his vision is as directing attention to a distinction between an 'inside' and an 'outside'. In contemplating this image of the ouroboros earlier our attention was focused on the inside, the totality of human experiences, including those of insights, and the thinking about them. What is inside the circle was the subject matter of the first two types of interpretation, the personal and the transpersonal. The image could also be saying, 'have a look at the outside as well.' It may even be saying that it is necessary to have a look at the outside in order fully to understand the inside. (I am using the term 'look at' because this discussion is prompted by the experience of seeing a snake.) When we look at the outside we do not, of course, find anything. There is nothing there because everything that can be seen, or experienced in any way, is inside the circle. To be more explicit, outside there are no things or subjects who experience those things.

Why then was Kekule asked to look at it? And why, by implication, are we all being asked to look at it? (An impersonal interpretation by definition applies to all human beings, and not just a specific individual.) I will venture to say that all people on occasion experience visions whose obvious interpretation is this very invitation to look beyond. There is a huge variety of such visions, probably as many as there are persons and occasions. And some are not invitations, but demands. We may pay them no heed, but they come all the same. But most people, I think, do stop to think, at least fleetingly, about these visions – and to give themselves up to the

emotional accompaniment of the symbol where that is also a component of the vision. Many engage with their visions more substantially, looking at the artefacts of those who have sought to communicate analogous visions or their engagement with them. Active engagement seems to result in the bringing forth of more, and more vivid visions on the same theme.

How is it possible to respond to this invitation to look beyond, outside the closed circle of experiencing? Normal discursive thinking is, after all, thinking about the relationships among things. In the beyond there are no things. The answer clearly is that we cannot think about the beyond in our normal way. No one ever has, which is why scientists and philosophers, at least in the Western world and in their professional integrations, have ignored the whole subject of the beyond. Or, they have conflated it with a realm they visualise as at one remove from immediate experiencing, but still within the circle of what can be described. Thus Plato speaks of a realm of abstract organising principles (his 'Ideas'), and many Enlightenment scientists said that the laws of nature were held in the 'mind of God'.

Nevertheless, I wish to suggest that we can think meaningfully of the beyond in relation to what is within. And indeed, we cannot avoid doing so. While we cannot describe what the beyond is in itself, we do recognise its existence in that we say it is what is outside the circle of the known and the knowable. What is beyond is necessary for the recognition of things that appear in experience. Appearances are only evident against a background of something that does not come and go, something that is ever-present and ever the same. That something is the beyond, the Nothing.

This line of thinking succeeds in establishing the following. First, the beyond is something, even if it cannot be described in terms of being a locus of particular entities or processes. In other words, it exists. Second, we have begun to define the beyond; it is ever-present and ever the same. With these definitions the discursive thought process has something to take hold of. At the very least we should be convinced that the beyond, as thus defined, is necessary to our conceptualisation of the process of knowledge creation.

2.2.4 The problem of literal interpretation

Insights, as was said earlier in Section 2.2.2, are glimpses of one or more of the primordial themes that are deployed by the causal agency to structure experience. Sometimes these themes are 'glimpsed' as formless intuitions, as in the work of Poincare, and sometimes as vision, as in the dream of Kekule. Intuitions are formless, that is they reveal directly abstract patterns of relationship, whereas visions are the same patterns clothed, as it were, in the forms of physical things. In interpreting visions we must be able to 'see' the formless pattern beneath the clothing. Or, in other words, we must be able to distinguish between the thing and what it symbolises. A failure to do this leads to serious mistakes in the work of formulating primary concepts and contexts.

Kekule, in interpreting his dream vision of a snake grasping its tail in its mouth, saw the symbolic meaning of the snake, which is the bare notion of circularity. He did not interpret to mean that the molecules he was concerned with are actually snakes. This may seem too obvious to need mentioning, but it does emphasise the distinction I am making, and serves as an introduction to a discussion of three other examples of visions that were interpreted literally and not symbolically. The first two of these examples are taken from the work of Plato. Because of Plato's importance in the history of Western thought his choice of literal interpretations created problems that are still with us today. The first of these two examples is of his concept of the nature of actual existents, and the second is his concept of a supra-experiential realm that houses the templates for the forms of all experiences (the 'Ideas'). The third example is taken from the work of Johannes Kepler.

In respect of the first of the two examples from Plato's work we may begin by noting that Plato was a confirmed materialist, assuming that there exists a world 'out there', and that the actual existents that make up this world are units of substance disposed in space. These units are of four types: earth, water, fire and air. In all this he was generally in tune with the thought of his time. In the Timaeus he addresses the question of what these substances are like. He answers it by saying that they are geometrical

figures, the first four of the Pythagorean regular solids, and that they are constructed from triangles joined together in various ways. Triangles are thus the basic structural elements of all substance. He thus proposed a system of atomic materialism, similar to, but somewhat more sophisticated than, that of Leucippus and Democritus.

Timaeus does not say how he came to assume this, but it is likely that his concept is based on insight. There does not seem to be any direct evidence of this; certainly Timaeus does not say he had an insight. However, I feel I am on reasonably firm ground here because we know that primary concepts are based on insight, and it is clear that Plato was not just taking over an existent concept, but was breaking new ground.

It seems likely, therefore, that Plato had a vision of a triangle or triangles and that he interpreted this vision literally. That he would have done so is understandable in view of his Pythagorean heritage. When the Pythagoreans said that all phenomena are based on number, they used the word number to mean a geometrical unit, according to E. A. Burtt (1923, p.42). The ultimate units of 'the world' are thus limited portions of space, marked off by various three - dimensional geometrical figures. Matter is these enclosed bits of space. It is further likely that the Pythagorean insight was itself a literal interpretation of a vision of a geometrical form. Plato was thus probably unaware of the option of interpreting his vision symbolically.

The symbolical meaning of the triangle is simply the number three, an entirely abstract concept in the sense that all numbers are abstract concepts used to define relationships. One rendering of this meaning in the present instance would be that an experience of a physical thing is a three-fold entity. The abstract elements of the experience are a subject, an object, and their interaction to produce an experience. The number three also indicates that the outcome of the process of experiencing, an experience, is the third of the three elements. Had Plato been able to choose this symbolic interpretation, he would have been led to write an entirely different story than he did in the Timaeus.

Incidentally, the numerical symbolism suggested above might be extended. If the subject is the number 1, the object the number 2 and the thing in an

experience the number 3, then the background against which the process of experiencing occurs, the beyond, or the nothing, is the zero, the no-number.

The second of Plato's concepts that exemplifies the mistake of literal interpretation is that of the 'Ideas'. These he visualises as abstract templates which determine the forms of things. There is a specific template for everything that is experienced. Further, these templates are all collected together in a timeless, space-less realm apart from the realm of experience.

I wish to suggest that this concept was prompted by a vision of the totality and unity of all experiences, a vision that occurs in all cultures and cultural eras. In Sanskrit it is termed the *vishwarup darshan*, a glimpse of the form of the entirety of creation. Like all visions it is impossible adequately to describe it in words, though numerous attempts have been made. Those that I am familiar with (for example, in the 11th Chapter of the *Bhagavad Gita* [Mascaro, 1962], and in the accounts of Christian mystics [Underhill, 1911]) rely heavily on the religious idiom of the particular culture of the recipient of the vision. However, all the descriptions invariably make two distinct points. First, there is a seemingly infinite array of discrete forms (physical things), and second they are united into a single whole.

As I said, I am presuming that Plato received such a vision, and that he interpreted it literally. This would account for both his concept of discrete templates and of their existing in a realm separate from that of ordinary, everyday experiencing. From this realm the templates impress themselves on collections of atoms to give them specific forms.

It is, however possible to interpret this vision symbolically. The forms of the vision are then taken as abstract organising themes, and the unity in which they are held is that of the abstract togetherness of all experiences. This unity is a vast system, based upon the mutual dependence of each theme for its definition and action on all other themes. It exists only within each and every experience, present, past and future, and nowhere outside them; there is no outside. It may be thought of as the operational aspect of the common unitary causal agency. (The other aspect is the archives in which the totality of all subtle traces or karmic seeds of actual existents

is stored.) This possibility of a symbolic interpretation of his vision probably did not occur to Plato. Because it did not he was led to introduce a radical duality into European thought about things experienced that has lasted to the present day. This duality creates a highly incoherent system of primary concepts which gives rise to avoidable violence and suffering. The most pervasive manifestation of this is the Cartesian duality of mind and body.

My third example of the literal interpretation is that of Johannes Kepler's insight that the solar system is built around certain geometrical figures which form its invisible skeleton. This is, of course, essentially the Pythagorean insight, appearing here in the area of astronomical research. How this insight came to Kepler, how he interpreted it and how he developed it into a model of the solar system are related in Box 2.2 *Kepler's insight into the*

Box 2.2 Kepler's insight into the 'mystery of the cosmos'

This account of Johannes Kepler's insight has been adapted from that given by Arthur Koestler in his *The Sleepwalkers.* It provides an excellent example of the role of insight in scientific work, and how important it is to interpret insights appropriately.

> From the frustrations of his first year in Gratz, Kepler escaped into the cosmological speculations which he had playfully pursued in his Tuebingen days. But now these speculations were becoming more intense, and more mathematical in character. A year after his arrival – more precisely on 9 July 1595, for he carefully recorded the date – he was drawing a figure on the blackboard for his class, when an idea suddenly struck him with such force that he felt he was holding the key to the secret of creation in his hand. 'The delight that I took in my discovery.' he wrote later, 'I shall never be able to describe in words. It determined the course of his life, and remained his main inspiration throughout it....
>
> In the Preface to ...[his] work [*Mysterium Cosmographicum*], Kepler explained how he came to make his 'discovery'. While still a student in Tuebingen, he had heard from his teacher in astronomy, Maestlin, about Copernicus and agreed that the sun must be the centre of the universe.... He then began to wonder why there existed just six planets 'instead of twenty or a hundred, and why the distances and

velocities of the planets were what they were. Thus started his quest for the laws of planetary motion.

At first he tried whether one orbit might perchance be twice, three or four times as large as another. 'I lost much time on this task, on this play with numbers; but I could find no order either in the numerical proportions or in the deviations from such proportions....

> I lost almost the whole summer with this heavy work. Finally I came close to the true facts on quite an unimportant occasion. I believe Divine Providence arranged matters in such a way that what I could not obtain with all my efforts was given to me through chance; I believe all the more that this is so as I have always prayed to God that he should make my plan succeed, if what Copernicus had said was the truth.....

The occasion of this decisive event was the aforementioned lecture to his class, in which he had drawn, for quite different purposes a geometrical figure on the blackboard. The figure showed (I must describe it in a simplified manner) a triangle fitted between two circles; in other words, the outer circle was circumscribed around the triangle, the inner circle inscribed into it. As he looked at the two circles, it suddenly struck him that their ratios were the same as those of the orbits of Saturn and Jupiter. The rest of the inspiration came in a flash. Saturn and Jupiter are the 'first' (i.e. the two outermost planets), and 'the triangle is the first figure in geometry. 'Immediately I tried to inscribe into the next interval between Jupiter and Mars a square, between Mars and Earth, a pentagon, between Earth and Venus a hexagon....' It did not work – not yet, but he felt that he was quite close to the secret.

[To cut a long story short, he then found that the Pythagorean solids would serve his purpose.] ...there existed only five perfect solids - and five intervals between the planets! ...it provided the complete answer to the question why there were just six planets 'and not twenty or a hundred'. And it also answered the question why the distances between the orbits were as they were. They had to be spaced in such a manner that the five solids could be exactly fitted into the intervals, as a invisible skeleton or frame. And lo, they fitted! Or at least, they seemed to fit, more or less.

(Koestler, 1959, pp, 249-53)

'mystery of the cosmos'. It is obvious that he, like Plato, interpreted his insight literally instead of symbolically. Fortunately however no damage was done because Kepler was subsequently unable to verify his model (context) when he tested it against the existent data on planetary motions. And, in any case, in his own lifetime, using the newly-invented telescope, three more planets were discovered to be orbiting the sun. That he did think it necessary to test his theory against empirical data was a sign of the changing thinking of scientists in the 17th century. Indeed, Kepler himself was one of the pioneers in bringing about this change.

Had he interpreted this insight more appropriately, he might have been led to a more general and sophisticated formulation of the concept of primordial themes informing all things.

2.2.5 An insight into the process of creation

The last example of a vision will be one of my own. I describe it because it has had a crucial role to play in the development of the story I am constructing here. It occurred several times in my life and was exactly the same every time. This is, I think, unusual. Still more unusual is that I only began to try to make sense of it late in life, and only when I had become familiar with the concept, as developed by Whitehead in his *Process and Reality,* that actual existents are momentary experiences, and the Buddhist concept of the momentary and transitory nature of all entities, and also had begun to wonder what Heraclites actually meant when he said that we never step into the same river twice. It could be said that this vision anticipated my future engagement with this concept. But equally, my attempts to formulate an adequate conception of momentary existents and build it into my story could be said to have triggered the memory of and the effort to interpret the vision. The interpretation then confirmed me in my decision to take up and work on the concept. The Buddhist philosophers, Heraclites and Whitehead quite likely had insights of their own that led them to formulate the concept for themselves.

My vision was of the hypnopompic type, that is, it occurred in the interval between sleeping and waking. In the vision there is a sudden arising of the simple awareness 'I am'; I do not know who I am or where I am. There is only the awareness that there is no 'me' (a person in an experience) and

no experience. I am all alone. The first time this vision occurred there was also anxiety; maybe I am really no one, nowhere. But then there was the sudden appearance of a familiar form – the person I seem to be in everyday experience – in a familiar place among familiar persons. With this there was a flood of relief wiping out the insecurity bordering on panic of the moment before. In later instances of this vision I was able to reassure myself that though I was apparently alone I would swiftly gain an identity - become a definite person in a definite place. All that was needed was to wait calmly. I did not in the least know what would appear, but only that something definite would appear. In a sense, what would appear presently, the objective me, already existed, even if it was not yet manifest. There was a feeling that during that brief waiting period there was intense activity going on 'behind the scenes', like the last-minute bustle on the stage before the curtain goes up.

The similarity of this vision to the many mythical accounts of the first man is obvious. One suspects that this very vision or ones like it are responsible for these myths. In the *Brihad-aranyaka* Upanishad we read how the first man found himself alone.

> Looking around, he saw nothing else than himself. He said....'I am'....Verily he had no delight. He was, indeed, as large as a woman and a man closely embraced. He caused that self to fall into two pieces. Therefrom arose a husband and a wife....He copulated with her. Therefrom human beings were produced.'
>
> (*Brihad-aranyaka* Upanishad, 1, 4, 1-3. Hume, 1931)

I have interpreted this vision as showing me, in slow-motion, as it were, how an experience comes into being. In essence it consists of the appearance of the duality of subject and object and their interaction to produce an experience. The subject, 'I', is clearly revealed as it seemingly stands alone before its full engagement with the object. The object is what is being prepared but what has not yet appeared (the activity 'behind the scenes').

What goes on 'behind the scenes' was not shown in the vision, and remains to be described in terms of the system of primary concepts that

are being described in this book. This will be done gradually as we proceed. By way of a brief preview, the process by which the content of an experience is created is one of gathering up impressions of selected karmic seeds of past experiences and fashioning them into the content of a new experience. Which particular seeds are selected and in what way their impressions are organised in the new experience is determined by the necessities of the current configuration of the causal agency.

This vision not only shows how in general an experience is created, but also raises the question of wherefrom the process takes its rise. The conclusion reached earlier (Section 2.2.1) was that all experiences occur inside the closed circle of experiencing and thinking about experiencing (which is also experiencing). It occurs, in other words, against the backdrop of the 'outside', or the nothing, the 'no-number'. We will now take the further step, as seems to be suggested by this vision, and say that an experience emerges out of the nothing. This suggestion has almost invariably been dismissed out of hand with the statement 'something cannot come from nothing.' Logically, this statement cannot be faulted. But the question refuses to go away, and this vision suggests that it should be faced. Earlier we reasoned that it is necessary to recognise the existence of the outside or the nothing in order to construct a complete story, or system of primary concepts. It seems to me equally necessary to accept the idea that experiences come out of the nothing, and for the same reason, whether it is logically defensible or not.

In order to entertain this last proposition that experiences emerge from the nothing, we must agree to the further proposition that on occasion insight can and should over-ride logic. Admittedly, this second proposition is fraught with danger in view of all the ways in which interpretations of insights can go wrong. But that is not an adequate reason to brush it aside. If we accept that insight is the decisive player in the creation of knowledge, then we have no option but to accept what insights show us; there is no reason at all not to, except when it seems to us that the interpretation of an insight is faulty. It all boils down to a question of judgement in any particular case.

2.3 Understanding things

The things that appear in episodes of experiencing are the basic input to the process of knowledge creation. The process occurs in two stages. The first is the becoming aware of things. The second is placing those things in contexts. A context is a group of other things experienced earlier that form a logical system. The thing introduced into the system becomes an integral part of it. When we are able to describe how the thing relates to the other things in the context we say we have understood it. These two stages are indicated in a summary way by the two boxes in the upper right-hand corner of the diagram in Figure 2.1 labelled 'Things' and 'Context formation'.

Given our understanding of a thing, and our concept of the common unitary causal agency, it is then possible to anticipate when and in what way similar things will appear in the future. (see box labelled 'Prediction' in Figure 2.1). If our predictions are successful, the contexts on which they are based can continue to be used with confidence, otherwise they must be modified or replaced.

The two arrows, pointing in opposite directions, that join the boxes 'Things' and 'Context formation' indicate that the movement from stage 1 to stage 2 is not a single, once-for-all occurrence, but a back-and-forth movement which continues until, for the time being, a final context is achieved. A simple thing is placed in a context, and the resulting understanding becomes a thing in subsequent experiences. The two stages cannot therefore be described in complete isolation from each other. There is a progressive development of both the things apprehended and the contexts in which they are placed. both things and contexts become more complex and comprehensive as the process proceeds.

We will begin by returning to the concept of a thing and developing it beyond the preliminary, introductory explanation offered in Chapter 1. This is done in Section 2.3.1 which follows. The full concept will be presented in Chapter 3, but we can describe it adequately at this point to meet our present needs.

2.3.1 The nature of things

A thing is what appears in an experience. Experiences follow one another very rapidly, a dozen or so in a second. An experience does not perish as it is succeeded by another, but recedes into the past as a karmic seed. There it is retained in the archives of the causal agency. When activated it yields up an impression of itself which participates in the formation of a new thing in the present. The thing in a new experience may be like the past one, though generally not in every detail, since every new thing is a unique amalgam of several previous things. The final form of a thing conforms to the current configuration of the causal agency.

In Chapter 1 it was said that a thing is simultaneously a system of parts, and a part of a larger system. These systems form a hierarchy of increasing size and complexity. A thing in isolation has no meaning. It acquires meaning when seen as a part of a larger system. It is a definable entity because of its place and function in the thing immediately above it in the hierarchy.

2.3.2 Integrations of things

In an experience only one thing appears. Neither its parts, nor the thing of which it is a part are experienced in that episode. Each of these becomes evident only in a subsequent experience where it is the single thing experienced. For example, when I look at the bookcase across the room, I see only the bookcase and not its context (the wall against which it is placed) or its contents (shelves, books). I see, in effect, only a bare rectangular shape. I see its context, the wall, in a subsequent experience, and its contents in another subsequent experience. To know that it is a bookcase, and that it is against the far wall of the room, requires yet a further experience in which these two subsequent things and the original thing are integrated. This integrating experience is of a thought thing. Were it not for this integrating thought thing, I would not come to know anything significant at all about what I identify as a bookcase, or even that it is a thing that in past experiences I have learned to call a bookcase.

The foregoing description of the bookcase against the wall is extremely simplified, and also incomplete. We will have to examine the process in

much more detail. In the first place, the integrated experience described in the previous paragraph is not an integration of only physical things (wall, contents), but of other thought things as well. Consider the contents of the bookcase. In any one experience I see only one shelf, or one book. The experience of the collectivity of all the shelves and books is again a subsequent integrating thought thing. And further, even the experience of a single shelf is a thought thing, for I can never experience the shelf as a whole as a physical thing. In a single experience I can only see the right or left end of the shelf (or its middle) as physical things. In the same way, in individual book is also a thought thing only. I do not also see the wall as a whole as a physical thing but as an integration of a doorway, a window, a light switch and a picture. The wall is a thought thing in which all these separate things are integrated. Further, even the window, and so forth are thought things.

The end result, 'there is a bookcase against the far wall of the room,' is, therefore an integration of integrations. Further, the series of integrations continues beyond those we have so far recognised, both 'downwards' (simpler and simpler integrations) and 'upwards' (more and more complex integrations). Let us consider the original statement, 'there is a bookcase against the far wall of the room', again. The phrase' against the far wall of the room' means that 'room' is a context for the wall. But to be intelligible, a room too must have a context which is a building, a house or an office block, which is not specified. And a building too, has a context, again only implied in this example. And so on. The largest possible, the ultimate, context is 'the world'. The word 'book' implies more than just an integration of the parts of the spine, which is all I see of it in this example. The title is an integration of words, the words are integrations of letters, and the letters themselves are not single, primary things.

The process of creating larger and larger things may be diagrammed as in Figure 2.2. Each dot in this tree-like structure represents an integration of previously-experienced things. These are integrated into successively larger and larger, and more and more complex, things until our immediate need for understanding is satisfied.

The original things (in the top row of the diagram) as they are received are virtually unrecognisable for two reasons. They appear too briefly and follow each other too rapidly to be clearly cognised as discrete entities. Further, as isolated things they are unintelligible. They are not facts that can be understood. At high-order levels of integration, the facts that result are too vast and complex to be useable. In our selection of facts, therefore, we are restricted to the middle range on the tree of integrations. If the context we choose to call a fact is too simple it will be trivial, but if too complex it will be vague. In our example of the bookcase, the statement 'there is a bookcase against the far wall of the room' would seem to be about right. It is obvious that whatever level we decide on, much will be left out - everything above the upper cut-off line, and everything below the lower cut-off line. What is left out is only implied and not explicitly stated. This can lead to uncertainty about the fact on the part of the recipient of the statement. Here then is another source of uncertainty in the overall process of knowledge creation. (Earlier two other potential sources of uncertainty were mentioned: an inadequate interpretation the symbols of insight, and an inadequate articulation of a system of primary concepts.) On the positive side, a poor choice of level of context is eventually revealed in further experience and the damage done repaired. The overall process of knowledge creation is a dynamic, living process, self-limiting, self-defining, and self-correcting.

A little more needs to be said about the upper and lower cut-off lines. It is not just that below the lower and above the upper lines it is not worthwhile attempting to construct contexts because the things that are to be contextualised are too small or brief, or too vast and thus vague. Where exactly the lines are drawn depends partly on how much effort we are willing to expend in capturing and contextualising things, but I think we must accept that there are no given cut-off lines, and what can be known simply fades into what cannot be known. This implies accepting that we are facing, for all we know or can know, an infinite regress at both ends of the scale.

A context is still more complex than has so far been indicated. A stream of successive experiences, if examined minutely, will be seen to

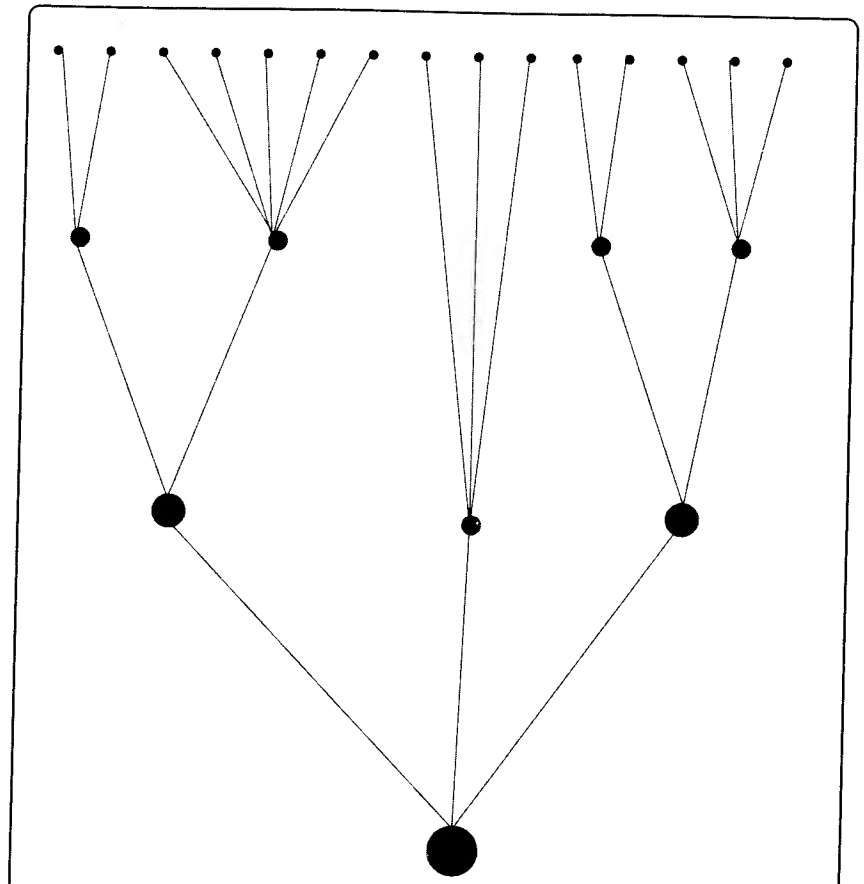

Figure 2.2. The process of successive integration of things

consist of things of different types. The predominant type of thing in any given segment of the stream may be, say, physical. But, interspersed among these will be thought things – such as the contexts already mentioned – and also emotional and feeling things. Thus, in the example of looking at a bookcase, in addition to the thought things already mentioned, there are other thought things as well, as, when my glance falls on a book on Aristotle's works, the thought of his concept of final causes appears, connecting to the further thought of how shabbily this concept has been treated in modern times. Or, the sight of my frayed college textbook on

crop production, leading to the further thought of the teacher who taught this subject, and how different my thinking is now to what it was then. On top of the bookcase is a framed photograph of my late wife, the sight of which triggers some fleeting happy emotions. My look lingers for the duration of several experiences on the beautiful pattern of the grain of the teak wood of which the bookcase is made. And this triggers the appearance of a feeling thing from the past: of how my finger hurt when I accidentally cut it with a chisel as I was making the bookcase.

Throughout my narration of the example of the bookcase against the far wall of the room, I repeatedly said 'I saw', 'my glance fell on', I thought', and 'I felt', 'I experienced a happy emotion'. All these statements point to the continuous relating of things of all types to 'my' body. These experiences of self-referral are all feeling things. In other words, each physical, thought or emotional thing that appears is followed by the experience of a feeling thing, a body of a *Homo sapiens* (which, in this example is seated in an easy chair on the other side of the room from the bookcase), and this in turn is followed by the thought thing that refers the physical, emotional or thought thing to the body. I have used the conventional phrases 'I saw' and so forth as shorthand expressions for this long process of self-referral that occurs with each physical, thought and emotional thing. This signifies, of course, that the I is an integral part of each of the other things in that it combines with each in a preliminary integration.

Finally, two further types of experience need to be mentioned. Suppose a person is standing in front of the bookcase, partially blocking my view of it – say, the central portion of it. Though I do not actually see the entire bookcase, I experience the thought thing, 'the two things I see look like parts of what I term a bookcase.' From an earlier experience, now recalled, of 'the' entire bookcase seen without a person standing in front of it, and of seeing many other entire bookcases in the past, also now recalled, I conclude that the two part bookcases are really part of one bookcase. There is a connecting middle part which I would see if the person were not standing there. This conclusion is a fact that I take into account in constructing a context along with the facts already mentioned. That my conclusion that there is a middle part which I cannot see is also strengthened

when I hear the person saying, 'this is really one bookcase; there is a middle part which you cannot see because I am standing here.' This statement too is a fact that I use in constructing the final context, 'there is a bookcase....'

These two types of facts differ from those described earlier. In constructing a context using them, I am not using them as such, but other facts derived from them: that there is a bookcase which I would see if the person where not standing there. If my derivation is faulty, the final context, there is a bookcase (that is, one bookcase) could be misleading. Perhaps if the person were not standing there, I would have seen two bookcases. In the second case, if the person has told me there is a middle portion (of a single bookcase) when I would have seen that there is no middle portion, but two bookcases, my use of the derivative fact in making my final context means that that context will be misleading. By the term 'misleading' I mean that when the prediction 'I will see a single bookcase when the person standing in front of it moves aside' will not be realised when the person actually does move aside and I see that there are two bookcases and not one as I predicted.

In any statement of fact such as 'there is a bookcase against the far wall of the room' there is a dominant type of thing. This dominance is indicated by the subject of the sentence, in this case the word 'bookcase'. If we say 'the room features a bookcase against the inside wall' the dominant element is the room. Or, in other words, the former fact is an integration around the thing book case, the latter fact an integration around the thing room. Both contain many subordinate elements. These sub-ordinate elements are not incidental or unimportant just because they are subordinate. They cannot be ignored without distorting the fact.

It is important to reflect on this matter of the complexity of facts. In modern science the complexity of facts is intentionally ignored in the interest, it is said, of exact description. In practice this means that they must be described in quantitative terms, that is, mathematically, as far as possible. In this way only the physical aspects of a fact (physical things per se or thought things that integrate physical things) are described and other aspects are ignored or displaced. The bookcase thus becomes a geometrical figure with certain dimensions, supplemented perhaps by a

mention that it contains, on an average, a certain number of books per shelf. That it is at the centre of my professional life and that it has not been dusted for several days are not described. The experience of looking at a computer-generated moving picture of the solar system context is an altogether different experience than that of looking at a set of equations that describe the relationships between an individual planet and the sun or its moon. In the former there are the all-important emotions of wonder and of participation. These aspects also are captured in the living-being model. What merely quantitative description can do justice to the sight of ocean waves crashing against the bottoms of the cliffs of the Cornish coast, to the sight and sound of Niagara Falls, the rising of a flock of pink flamingos from Lake Naivasha, the emotional experience on entering the Notre Dame Cathedral in Paris, or the sight of Neelkanth peak in the Indian Himalayas?

Equally serious, all the sub-facts – 'I saw (or heard or felt) the bookcase' – that are parts of the main fact 'I saw a bookcase...room', cannot be accounted for in the quantitative mode of description, or at least not in any reasonable and straight-forward way. Consequently, they are termed 'secondary qualities' which are said not to belong to the bookcase but are generated by the mind of the perceiver of the bookcase. 'Primary qualities' – that is, size, shape, mass, velocity, direction of movement – only are considered to be inherent in the thing perceived. We will not stop here and go into the various concepts and arguments deployed to justify this awkward manoeuvre; that would involve us in a comprehensive critique of the modern science. We will pause, however, to note that the notion of primary qualities itself is illogical. These qualities are not inherent in physical things, but expressions of relationships among things in a system. In isolation from the system (that is, context) of which it is a part a physical thing has no qualities at all. In itself it is nothing perceptible or conceivable.

No less serious is the notion that the quantitative-geometrical-mathematical mode of description makes science 'objective', entirely free from any influence of a personal nature. That this is an illusion should be obvious when we reflect on the overall process of knowledge creation. There cannot be any experience at all in the absence of an observer, and as long as we assume that the observer is a person what is observed cannot be observed impersonally.

One final matter needs to be stated explicitly in this section. A context, once formed, being a thing itself, does not disappear with the coming of the next experience, but recedes into the past as a karmic seed, as do all things. It is available, ready-made, for use in future experiences. It need not be created again and again. In dealing with problems where new contexts are needed to bring together lower-order facts and contexts in meaningful ways, they must be created at that time. If and when this is done satisfactorily in any given case, the new context joins the older ones in the archives of the causal agency, from where it can be retrieved as needed.

2.3.3 Types of integrations

Integrations are systems of things. Or we may term them communities. Each member of a community has something in common with all the others. There are three types of communities.

The first is what may be termed a temporal community. The members, that is, the individual things, that make up the community are similar to one another and immediately follow one another to form a logically connected series. A simple example of this type of community is a stone lying on the ground. It is not 'a' stone, but a series of similar stones appearing successively. When the individuals of this series are integrated in a subsequent thought thing, we say 'there is a stone lying on the ground'.

In another type of temporal community a part of a thing appears to move in relation to the other parts of the thing. Take for example the fact that I saw a meteorite moving across the night sky. The sky (or a particular section of it) is the thing experienced, the meteorite a part of that thing. The appearance of the thing is so momentary that I cannot say that the part (the meteorite) moved, that is, changed its position in relation to the other points of light in the night sky thing; in any single experience it was not moving, it was stationary. I can only say it was moving as a result of experiencing a series of similar things (night skies), one following another with no other thing intervening, followed by a thought thing in which the separate things are brought together, thus allowing them to be compared.(6)

The second type of community is created by integrations of things that are similar in form or have some other shared characteristic, such as the

colour green or a square shape. When I name a temporal community, I am also creating a shared - characteristic community. For example when I said 'I saw a meteorite', the word 'meteorite' signifies that I have related this experience to previous experiences which had the same general form. To create this community these previous experiences, along with the immediately preceding one are all brought forward and integrated, giving a community. Such communities may be of physical, emotional, mental or feeling things. They are termed shared-characteristic communities.

The phrase 'there is a stone lying on the ground' mentioned a moment ago is a temporal community composed of a series of appearances of a part (the stone) of a thing (the slice of the landscape in which it is lying). It is also a shared characteristic community inasmuch as each separate stone has the same appearance, or form. Most things, perhaps all the things we encounter in ordinary life and in scientific research are mixed temporal and shared - characteristic communities.

It has been said in Chapter 1 that all things are living beings. One feature of living beings is that their parts are in continuous relative motion. The stone lying on the ground at a particular place in a landscape appears to be unmoving. This is only because the time span over which the temporal community of our experience is too short for motion to be perceived. In longer duration communities, if they could be constructed, would reveal them to be moving. The models of events in geological time frames, such as the rise and subsequent wearing down of mountain ranges, for example, or of continental drift, seem to bear out this general contention that the parts of all things are in relative motion.

The third type of community is one in which the individual members form a system based on a set of logical relationships. The individuals may differ in form, but each has a definite place and function in the system. Examples are atoms in a molecule, planets in a solar system, organisms in an ecosystem, or the various organs in the body of a human being, and also communities of these – a planetary ecosystem, a galaxy and a government department.

Another way of classifying contexts is to distinguish between those that are public and those that are private. Public contexts have been created

to help us understand facts that are experienced by more than one person. Among human beings this sharing is facilitated by naming the contexts and bringing these names into a shared language. I will say more about the naming of contexts in a moment.

Private contexts are those created by an individual in an attempt to understand or 'make sense of' facts that are experienced by himself or herself and no one else. They are not shared, and indeed, cannot be shared. They are not named. The clearest and most common examples of private contexts are those of children. The child finds himself or herself in a family situation, say, that he or she does not understand, but which is at the same time painful or threatening. Because he or she lacks experience of life situations in general, or, in other words, has not yet accumulated a store of public contexts, he or she reacts to the unpleasant or threatening situation by creating a context which may be at odds with or unintelligible in terms of adult public contexts. The child is thus unable to share his or her contexts with adults.

The child's immediate response in such situations is to try to reduce the confusion, pain and insecurity he or she experiences by creating contexts such as: all adults are uncaring and cruel and I must therefore distance myself from them; my parents are bad or overly demanding or overly critical, but my friend's parents, or my cousin's parents are not – I will leave my home and go live with them, or in some other unspecified, but pleasant home. In other words, the child withdraws into himself or herself and daydreams about happier, more loving, secure circumstances. In his or her interactions with others he or she is fearful, dreamy, withdrawn or aggressive.

Another example of a private context created in childhood is of a situation in which parents are overly-indulgent or protective. In such a situation the child creates a private context of a world which is indulgent and which will respond positively to his or her every demand.

Since contexts once created and brought into use are highly persistent (see Section 2.3.5), these patterns of behaviour may be perpetuated into adult life, long after the situation in which they were created has ceased to

exist. When this happens, his or her behaviour seems to bear no relations to the situation he or she is currently in. Judged by accepted adult behavioural patterns (based on public contexts), he or she appears to be selfish, irrational or neurotic. The person himself or herself is usually not able to say why he or she reacts the way he or she does. If he or she could clearly recall when, how and under what circumstances he or she acquired the context that accounts for his or her present behaviour, or is helped to recall it, the childhood context may be seen for what it is, and thereby be set aside.

In defining public contexts a moment ago it was said that these contexts are named, and that this naming helps in sharing them. There are two main types of names. One is used for objects and the other for activities. 'Horse' is an object, a context constructed to explain a form. 'Running' is an activity, a context constructed to explain the systematic, repetitive changes in a given form over time. Both types of words are needed in explanatory contexts. Other types of words are employed in a subordinate role. These are words like 'many', 'few', 'much', 'big', 'small', 'green', 'triangular', and so on. Each of these words itself denotes a context. For example, 'big' and 'small' are contexts in which one set of things is compared to another set of things. 'Green' is a context in which a set of green things distinguished from a set of red things. Words, spoken and written, are termed abstract symbols.

People also share contexts by means of the concrete symbols of artefacts and myths.

2.3.4 A little more about insights

Now that the basic process by which manageable, reasonably meaningful contexts are generated has been described, it is necessary to return briefly to the subject of insights in order to tie up some loose ends. The things that appear in visions are created in the same way as those in the waking experiences we have just been discussing. However, the logic in terms of which the vision is constructed is different from that which operates in the creation of waking contexts. This matter requires our attention. Also, the physical things that appear in visions are often recognisably the same as

those in waking experiences. They are taken over ready-made, but then modified in ways that serve the purpose of the vision. This too requires our attention.

The parts of a vision thing are taken over ready-made from previous waking experiences. These things, in turn, are accessed by waking episodes of experiencing, when we recall them and try to understand them in subsequent waking experience. This indicates that while the karmic seeds of previous things, both vision things and waking things are, we can suppose, stored in separate sections in the archives of the causal agency, they can be accessed by all future episodes of experiencing, whether vision or waking.

The parts of a vision thing originate in waking experience. However, they are used symbolically. In order to convey a particular symbolic meaning, these things are altered in some way. They continue to be recognisable as the thing originally experienced in waking experience, but are given a 'twist', so to speak, that turns them into a symbol. In the vision, therefore, they no longer have the same meaning as they did in waking experience, but a quite different meaning. Thus a known (in waking experience) person, say my boss, though recognisable as my boss in a dream, seems at the same time to be the principal of the primary school I attended as a child. A similarity in my attitude or behaviour towards these two persons provides a context for my current waking experiences that did not exist previously – a context that could not have been created in waking experience.

In vision familiar waking experience things are also often assembled in unusual (in terms of waking experience) ways – again in order to convey a vision meaning. In a vision, for example, I am with a person I know in a place I also know, but my only experience of being in that place was at a time before that person was born. In this example the ordering of events in terms of waking-experience time, is not observed; rather the logical basis bringing these two things (person and place) together is that they both point to a hitherto unknown context without which I am unable to understand my current waking experience. The juxtaposition of these two things does not, in the vision itself, seem incongruous; it if did, the purpose of the vision would be defeated.

One final difference between waking and vision experiences must also be mentioned. The subject of a vision is always passive. He or she has no active part in creating the experience experienced. For example, he or she only comes to know that there is 'a bookcase against the wall of the room'. There is no self reference involved, as when I have the experience 'I saw a bookcase against the wall of the room'. There is also no mention of the 'far' wall, which is also due to the absence of self-reference since the word 'far' indicates my location in relation to the bookcase. This lack of self-reference may be the cause also of the indistinctness of the things experienced in vision. For example, I know who the person in my vision is directly and not a result of matching his or her features in the vision to those of the person when he or she appeared in a previous waking experience. This emphasises two distinctive features of visions that have already been referred to. First, visions are 'given' or 'shown'. So of course are waking experiences, but in that case I am also shown as having a role in creating them. Second, it is not the 'literal' (that is, waking) meaning of a thing that is to be grasped, but rather its symbolic meaning. Incidentally, the use of the phrase 'its symbolic meaning' is not to be taken to mean that a given physical thing has a single, fixed symbolic meaning in all visions. Its symbolic meaning depends upon its position in the particular vision thing of which it is a part.[7]

The process by which intuitions clothe themselves in form, 'after the fact', as it were, also needs to be recalled at this point (see section 2.2.2). In doing this a hitherto unrecognised feature of the process of context formation in general emerges, namely, that the form of a context, any context, exists prior to the coming into existence of the fact that embodies it. In other words, the form of a context is created before the context itself. This is more evident in the case of intuition than in vision and in the case of contexts of waking experience things. An explanation for this follows logically from an understanding of the nature of the causal agency. Causation is absolutely deterministic; every appearance is determined by the necessity that every new appearance shall conform strictly to the logical possibilities inherent in the totality of past experiences. The exact form, down to the last detail, of everything is determined before it appears. Thus, what will

be, what must be, guides, as it were, the creation of what is presently coming to be. The form of a context that is prior to the creation of the context already exists in the future and 'reaches back', as it were, to draw the process to completion.

2.3.5 The persistence of integrations

A context, that is, an integration of prior things, once created is never lost or destroyed. Nor does it lose its potency with time. By the term 'potency I mean its availability to the process of creating new things. It may be sidelined because it cannot accommodate new lower-order contexts that appear, or because some other newly-created context of the same order of complexity is created that can. Or it may be subsumed along with other contexts by a higher-order context. In no case, however, does it cease to exist, nor is the possibility that it can later be pressed into service again precluded.

Let us consider each of these cases, sidelining and subsuming, in some more detail. Several examples of sidelining can be taken from the history of science. I have chosen five of these; the first is an instance where a context was discarded but later comes back with virtually no change; the other examples are of contexts that are returning to contemporary thinking somewhat modified, but with their essential form unchanged. All these revived contexts are necessary to the development of the new science being described in this book. In the following discussion I will use the terms 'concepts' and 'contexts' inter-changeably.

In Europe in the 17th century the overall explanatory context for the movements of physical things changed radically from that of a living to that of a mechanical system. Of course this was accompanied and made possible by equally radical changes in the concepts (contexts) of actual existents, time, space, causation, the subject and knowing. That many people, including some scientists, were uncomfortable with the mechanical system context is indicated by the periodic appearance of vitalism in scientific discourse, and by the protests of the 18th-century romantics.[8] As a concept, the living system did not die, nor disappear from human thought, but in the

absence of all its necessary companion concepts ceased to be useful. During the last half century or so it is returning to scientific thought, albeit in rather vague terms.

A related instance of the persistence of the animist context has been brought to my attention by Stephen Hardings' book *Animate Earth*. He writes:

> Psychologists involved in the study of child development recognise that children pass through an animistic phase in their early years, during which they relate to objects as if they had a character and as if they were alive....They hold that this animistic phase is only appropriate to early childhood, and that one must help children to realise as quickly and painlessly as possible that they live in a dead world in which the only experiencing entities are other humans.
>
> (Harding, 2006, p. 21)

Paraphrasing this comment using the terms of this book, I would say that an animistic concept is a common and very persistent context which comes easily to children. Since it is at odds with the adult public dead-world context, it is forced to remain a private context. The child learns that it is inappropriate to use it in adult life, and so it gradually disappears from a child's repertoire of contexts as he or she grows up. In contrast to the unhealthy private contexts described earlier (Section 2.3.3), this concept, if not suppressed, and so allowed to grow into a contemporary public context could contribute to a more holistic view of human experience.

In the concept of the living system as we find it in ancient and medieval European thought, the intelligence and knowledge of living beings is ascribed to an indwelling soul. This soul is thought to be a part of, or reflection of, a universal soul – the *anima mundi*. In the system of primary concepts being described here this concept is replaced by that of the causal agency. Here too is an example of a context returning to the game after having been sidelined – though in a somewhat different formulation.

The third example I wish to cite is of a concept that was sidelined, but which is reappearing today – in this book – though in a considerably

modified sense. This example is of the centrality of human beings in public world contexts. Before the 16th century the Ptolemaic version of the solar system context with the earth at the centre, in addition to being an accepted scientific explanation, had by extension meant that the human beings and their activities and concerns were central to their world context. With the coming of the Copernican context, people felt that with the displacement of the earth from the centre, they too had been displaced. The alternative view grew up that human beings are marginal and inessential to the world context.

As a result of the analysis of things and contexts presented in Section 2.3.2, the concept of the centrality of human beings has reappeared, albeit in a modified formulation. Briefly stated, nothing whatsoever can appear in an experience in the absence of a subject. In a human experience that subject is said to be a person. It is a person who experiences the thought thing 'the world'. Apart from a person, there is no world. That the subject of an experience is not a person except by convenience, as we shall see presently, does not affect this argument and so will not detain us here.

My fourth example of a concept that was sidelined but has now reappeared is Lamarck's explanation of how the physical forms and behavioural patterns of plants and animals slowly change over generations. Admittedly Lamarck's formulation of this concept was inadequate: he said that the conditions in which the organism exists causes changes in the form and behaviour of its progeny, but did not say how this happens. Darwin's concept featuring chance variations and natural selection effectively sidelined Lamarck's conception by the end of the 19th century.[9] By the end of the 20th century, with the development of general systems theory, Lamarck's concept is being brought into play again, more or less as Lamarck formulated it. (It is said that the dynamics of the system creates new forms and patterns of behaviour. How it does so, however, is not described. It is said that novel forms and patterns 'emerge' from the system.) With the new science being described here, it becomes possible to say how, in principle, change comes about, even if in any specific case the vast network of causal links within the causal agency cannot be traced and described.

I would now like to cite an example of a context that is not sidelined, even though it disappears from view. In the beginning such a context seems successful, but later on becomes problematic. When this happens, it is subsumed by a more general context; it continues to be active as a part of the larger system.

Modern agriculture began in the first decades of the 19th century, following closely the developments in chemistry. By mid-century a complete context to explain plant nutrition had been formulated in outline. Plant growth was to be understood in terms of the soluble mineral elements the plant absorbed from the soil solution. In essence farming became a matter of 'feeding the plant' by adding mineral fertilisers to the soil. By the end of the century this concept or context dominated scientific thought, and has continued to do so to the present day. A brief introductory survey of this development will be found in John Russell's classic textbook Soil Conditions and Plant Growth published in 1912 (1955 edition, Chapter 1).

The negative feedback from this way of farming – deteriorating crop health, quality and yields – soon became evident, leading many thoughtful farmers over the course of the 20th century to formulate the alternative concept of 'feeding the soil'. This is a larger context than that of 'feeding the plant'. It does not sideline the 'feeding the plant' context, but subsumes it. According to this larger concept plants do feed on soluble chemical elements, but their health and productivity depend, in the long run, on the entire soil-plant-field-farm ecosystem. The minerals that the plant needs must be supplied by recycling the residues of previous crops and the excreta of the animals that have fed on those crops. This context is today steadily gaining ground in the shape of organic farming, natural farming, ecological agriculture and many other variants. The 19th-century context of 'feeding the plant' is thus very much alive, but buried and lost from view in the larger context of 'feeding the soil'. The negative feedback from deploying it as a stand-alone context is avoided. For a review of these 20th century developments see *www.soilandhealth.org*. For an Indian perspective on these same developments see *A Future for Rural India* (Jackson, 2013 b). This traces the displacement under Western influence of traditional agricultural practices, which embodied, in essence, the context of 'feeding the soil',

by chemical agriculture, during the 'green revolution' in the 1960s, '70s and '80s, the subsequent disenchantment with it, and the return of the traditional conception, now elaborated in ecological terms.

In this story we actually see two instances of the persistence of contexts. A traditional context ('feeding the soil') is sidelined by a new context ('feeding the plant'). (The former was also the basis of traditional agriculture in Europe before the 19th century.) The latter context, however, fails the test of practice, making way for the return of the traditional context. But the traditional context is returning, as it were, in a new incarnation; it is in essence the same but has been enriched by the incorporation of the 'feeding the plant' context, and new ecosystems context developed during the interval.

I hope the foregoing examples are sufficient to substantiate my claim that contexts never die or lose their potency, even if they are not used. If this be accepted, then it follows that, as new contexts are constantly being created while old ones continue to exist, the store of human-made contexts must be increasing. As time passes, therefore, it is more and more likely that the creation of new contexts to meet current needs is unnecessary. For more and more situations adequate contexts will exist. The challenge is to access them. For this we need to be attentive to insights and have the ability to interpret them appropriately. Of course we may find them in the historical record and in traditional myth. With the former we must be able to discern their essential structure and to modify it if necessary to suit our needs. With the latter, interpretation is needed in the same way it is in dealing with insights. And in all cases, humility is an asset; we need to approach our task with the conviction that 'there is [almost] nothing new under the sun.'

The totality of past contexts is held in the archives of the causal agency. So far we have considered such a store in respect of those contexts generated in the course of human experiencing. It is reasonable to assume, I think, that there are analogous stores for all other species of organisms as well, whether they be electrons, earthworms or galaxies. The bins or files containing the contexts for each cannot be accessed by an individual of another species. This seems to follow from my inability as a human being to think, feel, and behave as, say, an earthworm.

Before winding up this section, evidence of a somewhat different sort for the persistence of contexts should be mentioned. This evidence is provided by the persistence in the physical forms of plants and animals and of their habits and instincts from generation to generation. All these are instances of successful contexts created in response to the challenges to the survival of the individual, and to that of the species or society of which the individual is a member. Their persistence is accounted for by their success in practice, as is the case with the more formally-articulated contexts we have just been considering. It is important to remember that the persistence of contexts is not a matter of the person thinking to himself or herself, 'this context seems to be the best available and therefore I will use it'. Like all other things, it comes in an episode of experiencing because it must come. It is only when a commonly-appearing context fails to deliver that a new, alternative context will appear – a context that is necessary to correct the disharmony in the causal agency, a disharmony that manifests itself in the failure of the earlier context.

2.3.6 A system of primary concepts is also an integration

In order to tie up one more loose end it is necessary to return briefly to the topic of primary concepts. A moment's reflection will show us that the system of primary concepts that informs thinking and acting in a given culture or cultural era is also an integration of things, that is, a context. It is, as it were, a mega-context, for it is the most general framework, or scaffolding, within which a structure of detailed knowledge is erected.

The process of creating a system of primary concepts, however, differs from the process by which a context used to understand the facts of waking experience is created. First, there is only one type of input into the former: insights. The dashed line from 'Context formation' to 'System of Primary concepts' in Figure 2.1, as was mentioned at the beginning of this chapter, is not a substantial input, but only represents a signal from the one to the other that the system is in some way inadequate; the signal is like a spur to further work on the system aimed at improving it. It is more like a general, unspoken comment of someone struggling to understand some new fact or facts such as: 'In spite of all my efforts to

create a context for particular facts, I simply cannot do it; I need a more congenial system of primary concepts than this one.' Further work at the level of primary concepts may then result in a better system, but if this happens, similar subtle signals will probably have been sent back to the level of insights. And subtle signals of this type will probably have also been sent directly back to 'Insights' from 'Context formation'.

Second, systems of primary concepts are relatively impervious to the subtle messages sent back from 'Context formation'. Even if work at the level of 'System of primary concepts' is initiated, it will be a complete overhaul, not a matter of fine tuning. The only exception to this general statement is that a modification of the exact formulation of this or that basic concept may be done now and then. To elaborate on this brief statement, substantial changes in systems occur only infrequently, and only when large numbers of facts can no longer be understood in terms of the current system. People resist changing their primary concepts as long as they can avoid doing so by ignoring facts they are unable to understand or by waffling. They also ignore or ridicule as long as possible the seemingly spontaneous appearance at such times of radically alternative concepts. But when the pressure builds up sufficiently, they let go of the old system and get down to the work of creating a new one. 'Letting go', or 'leaping into the unknown' is, in anticipation, extremely stressful, which is why it is put off until the situation becomes almost impossible. Such situations occur only rarely in the history of human thought. The justification for this book is that we are now at such a point in history.

2.4 Prediction and testing

It is my aim in this section to show how the two sequential operations of 'prediction' and 'testing' together contribute to the overall process of knowledge generation. I use the term 'knowledge' to indicate the outcome of our efforts to 'learn the ways of things'. That outcome is a set of contexts that enable us to understand the facts presented in experience. The understanding that comes with the creation of new contexts must be considered provisional until it is tested in practice. To be successful in

practice, contexts must enable us to predict the future appearances of things. If they fail these tests they cannot be considered to constitute valid knowledge and must be revised or discarded.

2.4.1 An overview of the validation process

The first stage in this process of validation is prediction. On the basis of a context that explains why a particular thing is the way it is, a prediction is made about when a similar thing will appear in the future. I say 'I saw a sun rise in the East this morning, and on many previous mornings as well, and I expect to see a sun rise in the East tomorrow morning also.' 'I burnt my finger when I put it into a fire, and I can expect it to get burnt every time I put it into a fire.' 'A maize seed, when placed in the soil with some compost in the spring and watered regularly has always grown into a maize plant which produced more maize seeds, and it always will.' And so on.

These predictions can be tested: I can watch for the expected sunrise tomorrow morning, place my finger in a fire and plant a maize seed in the way I did in the past (or in the way someone told me he or she did it in the past). If a sun does rise, if I do burn my finger, and if I produce a maize plant as expected, I say that the contexts on which I based these predictions are validated. I can then rely on them to guide my activities in the future.

The exact way in which these predictions are tested varies. In some cases, as for example, a rising sun, I simply wait for its appearance – or non-appearance – to validate my context – or fail to validate it. Of course, I must look in the right place at the right time. If my prediction fails, I cannot be said to have an adequate understanding of the original appearance of the sun. It will then be necessary to return to the earlier phases of the process, that is, to the prediction phase, or even to the phase of context creation, for further thought and work.

In the case of the prediction of a burnt finger, or the production of more maize seeds, I must put my finger in a fire or plant, water and tend a maize seed. If, in these tests, the expected thing, a burnt finger or more maize seeds, does not appear, the prediction will be considered to have failed.

Where we have invented a new type of thing or process we test it by deploying it in an everyday situation and look for the benefit it has been designed to deliver. If this new type of thing does deliver the intended benefit but at the same time unduly disturbs the situation in which it is placed, it will be judged to have failed. Examples of failures of the latter type are the alarming conditions to which agricultural ecosystems have been reduced by contemporary chemical agricultural technology and the inability of mainstream medical practitioners to deal adequately with cancer. These failures signal an urgent need to return to the earlier stage of context formulation or the stage of the formulation of a system of primary concepts.

2.4.2 The nature of causation

Fundamental to the task of prediction is the conviction that the appearances of things in experience are caused. In terms of the concept of causation deployed in contemporary global culture, the appearance of a thing or event (a temporal community, which is also a thing) is caused by the prior appearance of another specific thing or event. This means that a given thing, say a type B thing will appear only if a type A thing precedes it; if an A type thing does not appear, a B type thing, will not appear. These statements are taken to mean that the appearance of A type things causes the appearance of B type things That this simplistic concept is inadequate is attested by the unexpected violence that is happening all around us today.

With the concept of causation assumed here, there are no specific causes, but only one general cause, the same cause for the appearances of all things. Everything that appears is as it is, and as it must be, because everything that appeared prior to it was as it was, and had to be. Each thing in the past not only exerts its causal influence individually but in co-ordination with all the other things in the past, irrespective of when in the past it appeared. Thus, the cause of a thing being as it is only one: the totality of the causal influences of all previous things acting through the causal agency. In terms of this alternative conception of causation it is therefore a mistake to attempt to isolate specific things in the past and label them 'causes'. And it is impossible, because all things in the past

are causes, and they are innumerable. Continuing with the maize seed example, it must be planted in proper soil, in the right season, watered and weeded, and there must be someone to plant it, a someone who has acquired the knowledge of how to grow the plant, and who has a need for food, and so on; these are examples of other 'causes'.

While the causal agency is the same for all things that appear, its specific configuration changes from moment to moment, with the addition of every newly-created thing as it moves from the present into the past. Each additional thing affects the overall configuration of the totality of past things, even if only a little.

The configuration of the totality of past things is determined not only by its content, but also by the primordial themes that operate within it. These themes are invariant in their basic form, but infinitely flexible in action. The actual configuration of the causal agency at any given moment is therefore constrained by the basic forms of these themes acting in concert with each other. The form of the totality of these constraints is not invariant, but infinitely flexible, as are its constituent primordial themes. Because of the invariance of the basic forms of the primordial themes, some types of things are more likely to appear in the future than other types.

These considerations lead to the following conclusions. First, no attempt is made to explain why things are as they are in terms of causation beyond saying that all things alike are caused by the common unitary causal agency. There are no specific causes.

Second, given this first conclusion, we turn to more proximate reasons for things being the way they are. A thing is the way it is because of its place and function in the larger thing of which it is a part. This has already been stated in section 2.3.1, but was not accompanied by a clear statement why the alternative of specific causation is not an option, given the concepts of this book. At that time it was also said that a thing cannot be explained in terms of its parts. This must also be repeated here. The logic of this statement is that the sum of the knowledge of individual parts of a thing cannot ultimately explain either its form or why it behaves as it does. The

form of a thing and its behaviour are both determined by its relationships to the other things in the larger thing of which it is a part. Or it can be said that both the form and behaviour of a thing is determined by the context in which it is placed.

2.4.3 The challenge of making good predictions

We now have a clear-cut basis for making predictions about the future appearances of things. A thing of type A, say, will probably reappear when the type of context in which it appeared in the past reappears.

In practice, of course, there are numerous challenges to be faced. No two contexts can be expected to be exactly alike. To be able to judge to what extent a context is, or is not, like an earlier context it is necessary to have an accurate description of the earlier one. The term 'accurate' here means that the description should, above all, make clear the essential structure or form of that context. A failure to do this may result in a prediction failing when tested, simply because the two contexts are not essentially the same. Further, it is necessary to describe A accurately, for no two As are exactly the same. In every case a judgement must be made whether the As are essentially the same or not. Or in other words, what will be considered a 'reappearance' of A? These problems are not different, for all contexts are things and all things are themselves contexts.

Related to this challenge of accurate description of things or contexts is the challenge of deciding whether in any given case a prediction has succeeded or not.

Predictions fail in three ways. First, the type A thing that was expected to appear does not appear. Second, a type A thing appears, but it is accompanied by a type X thing that was not expected. And third, a thing similar to type A things, but different in significant and unexpected ways, appears. In the second and third cases a judgement has to be made whether the unexpected occurrences negate the prediction or not.

To summarise: predictions must describe the things we expect to appear and the contexts in which we expect them to appear. In both cases, these

descriptions will be in terms of the roles and functions of the things or contexts in the larger things or contexts of which they are parts.

One of the most clear-cut examples of a simple failure of a prediction is found in the work of Johannes Kepler in the 17th century.[10] Like all other astronomers up to that time Kepler assumed that all planetary orbits are circular. This and the concept of uniform motion were features of all the explanatory contexts devised since the time of Ptolemy. Using the observational data of Tycho de Brae, which were far more accurate than data available till then, he had already shown that planets cannot be considered to move at a uniform velocity, and had constructed a modified and simpler version of Copernicus' heliocentric explanatory context (model). He then set out to determine the radius of Mars' (circular, so he assumed) orbit around the sun. However, he found it impossible to construct a circular orbit which would accommodate all the predictions made on the basis of Tycho de Brae's data. In other words, Mars was not found to be at the places predicted if its orbit was circular. The As did not appear where they were expected to appear.

In constructing their explanatory contexts all astronomers from antiquity to, and including Kepler, employed the concept of circularity. The concept was not indicated or mandated by observation, but was assumed *a priori*. It may have originated as an insight that was incorrectly interpreted. Whatever its origin, Kepler's calculations showed that Mars' orbit could not be considered to be circular. The discrepancies between where Mars should have been if its orbit was circular and where it was actually observed to be were as much as eight minutes of arc. 'Ptolemy, and even Copernicus, could afford to neglect differences of eight minutes, because their observations were only accurate within a margin of ten minutes anyway (Koestler, 1959, p. 326).' Here is what Kepler had to say about this:

> 'But...for us , who, by divine kindness were given an accurate observer as Tycho Brae, for us it is fitting that we should acknowledge this divine gift and put it to use....Henceforth I shall lead the way towards that goal according to my own ideas. For, if I had believed that we could ignore these eight minutes, I would have patched up my hypothesis accordingly. But since it was not permissible to ignore

them, those eight minutes point to a complete reformation of astronomy: they have become the building material for a large part of this work....[11]

Let us now analyse this story in terms of the concepts being adopted in this book. The thing which failed to appear exactly where it was predicted to appear was Mars. The basis on which he made this prediction was his context describing the structure of the solar system. It is important to remind ourselves at this point that his context was not a model of a physical entity 'out there'. It was a thought thing, a context constructed in an attempt to understand the huge number of lower-order contexts such as, 'I saw a point of light in the night sky named Mars at x o'clock on y date at z position relative to the fixed stars and my position as an observer.' The prediction was of the form, 'on y date at x o'clock I will see Mars at z position.' The fact that he did not see it at that place at that time on that date, but at a little distance from it, was taken by him to mean that the prediction had failed. This mandated a return to the context being used in order to revise it. Kepler resisted the easy way out that astronomers had invariably taken of introducing circular epicycles into his context. Instead he changed his existing concept as to the particular shape of the primordial theme informing his context. That theme was indeed a circular structure, not a circle, but an ellipse.

A circular structure is a two-dimensional shape formed by a moving point that draws out a line as it moves. Its movement deviates gradually and continuously in the same direction from a straight line until it meets its starting point. If its rate of deviation has been absolutely uniform over time, the resulting structure is a circle, that is, a circular shape whose radius is the same from whichever point on the circumference it is drawn. If the rate of deviation is not uniform, an ellipse of some sort will result. A square, rectangle, and a parallelogram, it must be noted, are not circular structures because the moving point at times changes direction abruptly (coming to a halt and then starting up again).

For our purposes, it may be said that an ellipse is a 'deformed' circle, since in imagination we can apply pressure to a circle simultaneously

from two opposite sides, thus flattening if out. This 'flattening out' does not mean that the ellipse has ceased to be a circular structure, and no amount of squeezing like this can convert it into a square. A square is a distinctly different type of structure, a different primordial theme from that of circularity. In constructing a context for planetary movements, the concept of a circular structure seems inevitable; at least no one so far has created a context in which the orbits of planets and moons are square or triangular.

Another primordial theme used in solar-system contexts is that of a sphere. All the things in these contexts are spheres. They may be somewhat flattened, but they do not cease to be spheres thereby. Again, this theme seems to be inevitable; no one has so far created a context in which the sun, planets and moons are cubes or tetrahedrons. When I say 'inevitable' I mean that a solar system context cannot be created just any old way. There is only one way a given context can be created, only one predominant primordial theme that can come into play.

I have dwelt at considerable length on this topic of circular orbits and spherical planets in order to justify some general conclusions about the nature of all primordial themes. All are invariant in essence, but are infinitely variable in their expressions in particular contexts. Or, in other words, they can be deformed to any extent but do not cease to be their essential selves.

Yet other themes are obvious in all solar-system contexts. One is that which determines that a planet or moon revolves on an axis of its own and that this axis is always perpendicular to the plane of its greatest circumference. Another is that which determines that one body revolves around another.

An example of the second type of failure of a prediction, that is, where a type A thing appears but is accompanied by a type X thing that was not expected, is the use of insecticides in human disease prevention campaigns and in agriculture. The context is simple, indeed simplistic. A particular type of insect is thought to be causing a problem (creating human illness by transmitting a micro-organism, or reducing crop yields by eating or sucking the juice of plants); by killing the insects of this type, the problem will be solved. That the insects of this type will die when sprayed with the

poisonous chemical is established in the laboratory or in the crop research station prior to conducting the test. In houses and fields (the test context) sprayed with the insecticide, the insects do die (the appearance of the expected type A thing). But two other things also appear: other organisms, including human beings, are also killed and new strains of type A insect appear which are resistant to the insecticide. Thus the original problem is not solved, except in the short-run, and new problems, after a lapse of some time, usually only a matter of a few years, appear. The prediction that insects will be killed actually fails in two ways.

The prediction in this case fails because the contexts in which it is formulated are inadequate. The laboratory and field trials in an experiment station are comparatively low-order (low-complexity) contexts (integrations), whereas the contexts in which the prediction is tested, our houses and fields, are comparatively high-order (high-complexity) contexts. The former is, in principle, subsumed by the next higher-order context, and this is repeated many times before the latter is reached. With each advance to a higher-order context, that is, with each increase in the level of complexity, the less certain it is that a prediction based on the lower-order context will be successful. In the range of orders of contexts covered in this example, the laboratory and the experiment station, are very low-order. The results of the experiments conducted in these contexts are of little help in ensuring that interventions in high-order, everyday contexts will be successful.

A clarification is needed at this point of the meanings of the terms being used in this example. The term 'testing' is used exclusively to refer to what is done in the higher-order contexts of everyday in order to determine whether or not a prediction is fulfilled. The so-called testing, or experimentation, done by scientists in the low-order contexts of the laboratory and experiment station are parts of the process of firming up a context in terms of which a prediction can be made.

In this example, the prediction also fails because it does not specify any time frame. In the short run it seems to succeed; it is only over a period of several years that a final verdict is passed. A violent intervention in a large, complex system destabilises it, throwing up various symptoms of dysfunction. All this does not, however, happen immediately.

The reason scientists – and everyone else – plan and carry out such interventions as spraying poisons is that they do not 'see' the system in which they are intervening. They 'see' only isolated single-factor causal relationships. The huge volume of negative feedback from testing should force our collective thinking back to the stage of primary concepts, but this rarely happens. If we accept the concept of a unitary causal agency and act on it we would be led to an entirely different understanding of 'problems' such as those in the examples cited here. In many cases, the problem simply disappears because it is no longer seen as a problem; that is, the problem is seen to be other than what we earlier assumed it to be. This might lead to more successful predictions, and the development of more effective ways of acting in every-day contexts.

Another example of the second type of failure of a prediction is the deployment of the internal combustion engine. These engines succeeded in meeting the expectations of their inventors and those that deployed them in everyday contexts: greater labour efficiency in the production of goods and services, increased speed of travel, greater convenience and comfort. But along with these, other, unexpected things have also occurred, most notably an increase in unemployment, a rise in the carbon-dioxide concentration in the earth's atmosphere, smog, oil spills and oil wars.

To understand the reasons for these unexpected appearances, it is necessary to review the mechanistic approach to context formulation introduced by Galileo. He worked from the concepts of discrete material entities and of simple causal relationships between two of them at any given time. His approach to creating an explanatory context is to create, as far as possible, 'ideal conditions', an abstraction in which everything that can affect the behaviour of the phenomenon under study except one is held in abeyance. The results can then be neatly expressed in mathematical terms. These equations are then used to design the internal combustion engine. The basic reason that these engines are a failure is that predictions as to their performance in everyday contexts are made from the results of experiments done in very low-order contexts ('ideal conditions'). Everyday life contexts are very far from 'ideal' in that what happens in them is determined not by specific known causes, but by the totality of everything that has happened in the past, is happening at present and will happen in the future.

A third way in which predictions fail is that a type A thing which is expected to appear does appear, yet is different in important ways from the A we had expected. An example is what is called 'development'. It predicts an improvement in human well-being by an increase in the production of goods and services and the consequent consumption of these. This prediction has officially been in the process of being tested on a global scale ever since the end of World War II. Increases in production and consumption have certainly occurred, but whether increased human well-being has occurred is debatable. In fact the feedback from the testing process is, on balance, negative.

This negative feedback takes several forms.

1. The consumption of goods and services increases for only some people and not for all. Indeed, a large proportion of the global population has been marginalised, even exploited in the pursuit of increased production. The logic of this outcome seems to be that development is only possible, in a global context, if a large proportion of the global population is denied an opportunity to share the increased availability of goods and services.
2. The proportion of the global population that does have access to the increased goods and services over-consume leading to lowered physical, mental and emotional well-being.
3. In the pursuit of increased production, huge environmental damage and the exhaustion of natural resources have occurred, jeopardising the future welfare of all human beings everywhere.
4. Violent conflicts over the control of the natural resources needed for development are occurring, and are likely to become more widespread, leading to immense human suffering.

These outcomes from the testing of the development prediction in a very high-order context (the entire earth) over more than half a century seem to me to justify the conclusion that the prediction that increased production and consumption will lead to increased human welfare has failed.

The reasons for this failure is that the nature of A, increased human welfare, is not described adequately. The many contexts from which the

prediction was formulated are of a very low-order in terms of geography, nationality and classes of people and in terms of time period. And then there is the bland concept that the vast process of the production and consumption of goods and services and their equitable distribution globally will be ensured by 'market forces'. This is as misleading as the concept that all planetary orbits are circles.

More fundamentally, this is another example of the simplistic approach of those who have no understanding of the complexity of things. Here we return once more to the need for an alternative concept about the nature of causation, not to mention all the other alternative concepts that necessarily must accompany it. They respond automatically to the negative feedback from development in terms of single causes and effects. Perversely, if what we are doing is wrong, we can correct it by doing more of the same; all that is really needed is some fine-tuning of the ways we go about producing and distributing goods and services.

There is no escape from the need to test predictions in high-order, everyday contexts. And yet the risk of failure is often not apparent until extensive and irreparable damage has been done. Two measures to minimise such damage suggest themselves. One is to limit the geographical extent of the test as far as possible. Thus in testing a pesticide, an initial 10-20 year test might be made in one locality, say, a specific urban or rural ecosystem, and a sharp lookout kept for any symptoms of ill health in the system. The risks of failure even in this small test are, however, quite likely to be unacceptably high. If they are, then the only alternative is to exercise circumspection. In this regard I cannot do better than relate my own personal misgivings as a child about motor cars and chemical fertilisers. Contemplating the noxious exhaust from our family car back in the 1940s, I felt a deep revulsion, both physical and emotional. The physical was straightforward. The emotional was a deep pain at the thought of the pollution of the atmosphere. Such pain is, I have found, a common reaction to the violent disturbance of a beautiful, natural element or place. No amount of explaining away such as, 'no matter, these fumes are miniscule in volume to the immensity of the earth's atmosphere', could lessen this pain. On another occasion, when helping my father sow a maize crop, I contemplated

the corrosion of the metal fertiliser chutes in the maize planter. These were iron, as there were no plastics in those days (again, the 1940s). I asked myself 'how can this fertiliser (super-phosphate) be good for the soil and maize plants when it eats up metal like this?' There did not seem to be any answer to this question, and therefore the emotional pain could not be assuaged. I felt that if I asked my father or other grownups I would be dismissed as childish, naive – or worse. In the grand march of scientific progress, who heeds the misgivings of a mere child? And so I kept quiet and in time learned to be complicit in what some part of me continued to tell me is wrong. Sixty years later, we face climate change and the near terminal illness of our agricultural ecosystems.

2.4.4 The challenge of describing contexts

In order to predict successfully the appearance of a particular thing in the future we must describe adequately the context in which it is expected to appear and also the context from which the prediction originates. I am arguing that when these two contexts are the same, predictions are more likely to be successful than when they are different. The thing that is expected to appear must also be described adequately. The challenges of describing both are the same since the thing that is expected to appear is also a context. By the term 'adequate' I mean that the logical structure of the thing or context should be identified and described. I do not mean an exhaustive enumeration of the parts of the thing or context, but rather a description of the relationships among them. This structure of relationships, as an abstract entity, is what has been termed a 'primordial theme'.

In describing a given thing, it is impossible to take into account all of its myriad details. This is because most of the details of the things (or contexts, or facts) utilised in constructing the thing are not made explicit. A context, it will be recalled, is extracted from the middle range of the hierarchy of integrations, leaving behind large numbers of lower- and higher-order integrations. Further, out of the large number of details that are included only a few will stand out, so to speak. We tend to select from these for the purpose of conceptualising an organising structure. These selected features of the thing are termed 'markers'.

A few examples will help in understanding this process of describing the organising structure or primordial theme operating in a given context. The first is that of rainfall prediction.[12] In India the rainfall event of over-riding importance to life is the monsoon which comes in June or July, depending upon which part of the country one is considering, and lasts for about three months. It brings two-thirds to three-fourths of the total annual rainfall. Modern monsoon rainfall predictions made by the Government Department of Meteorology are not very helpful to farmers in deciding what crops to sow in the monsoon season. What crops they sow depends on the expected date of the onset of the monsoon and the total amount of monsoon rain expected. The Department makes long term predictions only for the country as a whole. For specific regions its predictions are short-range, that is, for a period of three days only. Consequently the farmers in unirrigated regions of the country rely on traditional Vedic methods of monsoon rainfall prediction. These are based on the concept of marker events. The markers are events like wind direction, appearance of the sky, rainfall on specific days of particular constellations of stars. The behaviour of particular plants and animals before the onset of the monsoon are also used as markers. These markers have been identified by systematic observations over many generations.

To give some idea of the procedure, I describe one method as reported for the Saurashtra region of Gujarat State in western India. The rate of success of the predictions made by this method determined over a recent 10-year period was found to be 80 percent. This prediction utilises only one marker to predict the onset of the monsoon, the flowering of the *amaltas* tree (*Cassia fistula*). It bears bunches of golden yellow flowers about 45 days before the onset of the monsoon. In the 10-year period from 1996 to 2005 the monsoon began 45 days after the tree flowered, with a margin of error of plus and minus three days, in eight years. In the remaining two years the onset of the monsoon was seven and nine days later than predicted.

Eight predictions of the adequacy of the monsoon (amount of rainfall received) based on events during specific days of particular constellations were similarly found to be equal to or more than 80 percent of the time over periods of 10 to 15 years.

The high degree of reliability of these predictions can be interpreted to mean that the selected markers quite accurately characterised the essential structure of the context in which they were developed. Other contributing factors were that the contexts in which the predictions were made and later deployed were one and the same, and that the predictions were based on careful, long-term observations. As suggested earlier, these are basic requirements for making accurate predictions.

A second example is where a specific innovation is introduced into an everyday context and we wish to predict whether or not it will be successful in achieving the ends for which it was devised. The innovation I wish to refer to is one of the most important in human history, and one that has, by and large, failed. This is the advent of agriculture. Most agricultural ecosystems, and the most productive, are converted forest ecosystems. The conversion of forest ecosystems to agricultural ecosystems involves a removal of all, or most of, the original trees, stirring the soil and planting seeds of crops that produce food and fibre for human consumption, and fodder for cattle. As a result of this the soil surface is therefore often left bare for much of the year, leading to an accelerated rate of oxidation of soil organic matter, accelerated soil erosion (due to water and wind), decreased rainwater infiltration, an increased incidence of pests and diseases and usually a slow decline in productivity. In a word, these ecosystems become sick.

Contemplating this problem in the early 20th century, Sir Albert Howard, an agricultural scientist working in India, concluded that in the forest to cropland conversion process the essential structure of the ecosystem is destroyed. He described the essential structural features of a forest ecosystem as follows:

1. 'mixed cropping is the rule;
2. 'the soil is always protected from the direct action of sun, rain and wind';
3. 'the forest manures itself';
4. 'crops and livestock look after themselves'.

These can be paraphrased as:

1. 'a great diversity of organisms';
2. 'the soil surface is continuously covered';
3. 'all biomass produced by the system is recycled to the soil;
4. 'all the species in the ecosystem are adapted to it which ensures adequate health and productivity'.

He maintained that if, in our farming activities, we imitate the forest that originally occupied the site, our farming will be successful. He demonstrated this in his own farming practice. In the course of the 20th century many other alternative farming systems that do this have also been developed.

Howard's argument may be stated as follows. Looking at a healthy and productive forest ecosystem, we visualise equally healthy and productive crops of wheat, rice, pulses, oilseeds, cotton, sugarcane and so on in its place. By clearing away the trees and other forest vegetation (and preventing their return), stirring the soil and planting crop seeds we expect to realise our vision. This expectation (prediction) is apparently fulfilled in the first few years, but then other, unexpected things begin to appear. In temperate regions these may take a (human) generation to appear, but in the tropics as little as five years. If we had recognised the essential structure of the forest ecosystem as described by the four 'markers' mentioned (an adequate description of initial context), and sought to preserve it whilst transforming the forest to crop fields all might have been well. No doubt, the structure of the forest ecosystem will be deformed in converting it to farmland, but the conversion can be done without changing it in essence. (Take the case of soil cover: instead of a mat of fallen, dead tree leaves, a continuous mulch of crop residues and animal manure can be ensured.)

Howard did not employ the terminology of ecology as I have just done - his work was done before the advent of ecological thinking - but the ecological concepts these terms denote are implicit in his writing. He does not use the word 'ecosystem', but says that his method of farming imitates 'Nature's' (with a capital N) farming. In writing of the ill effects of failing to imitate Nature, he enumerates what I have termed symptoms of ill health.

Incidentally, the concept of systems 'health' introduced in the foregoing discussion is a valuable addition to our conceptual repertoire. Health can readily be assessed in any system (organism); some of the major symptoms of ill health in an agricultural ecosystem are excessive soil erosion and rainwater runoff, declining and erratic crop yields, increased occurrence of crop pests and diseases. If these appear, it is a certain indicator that one or more of the markers has not been recognised or respected. Take the example of the spraying of poison to kill insects given earlier (p. 80). The insect causing the problem is a resident of the ecosystem and when the system is healthy its population size is regulated, kept within limits. If becomes a 'pest' when its population size exceeds the usual limits. When this happens it should be seen as an indicator of temporary or permanent systems ill-health, following on from a violation of the system's essential structure. The way to deal with the problem of 'pests' is to help the system regain its health (that is its structural integrity). And we should not expect that, even in a generally healthy ecosystem there will be no increases in insect damage to our crops on occasion, just as we are not surprised when a generally healthy person occasionally gets the flu.

2.4.5 The limits of predictability

The appearance of a thing in the future may be probable, but it is never certain. However good the basis for making a prediction is, there always remains the possibility that the next prediction might fail. We have seen that contexts are always arbitrarily chosen. That is, in deciding what our working context will be, we always draw an upper and a lower limit in the hierarchy of levels of integrations. All the things above and below these cut-off limits are not denied, but they are not made explicit. These excluded high- and lower-order things are thus not available for use in making predictions. By including as many higher-order and lower-order things as possible, predictions at a given level may be improved.

In the two-slit experiment, whether or not the next electron will pass through slit A is entirely uncertain. No prediction can be made. If the experimental context were to be re-embedded in the higher-order things from which it was separated in the first place (the laboratory, the experimenter

and his or her conceptual repertoire, and all the structures and activities outside the laboratory), and if it were possible to use lower-order contexts in the formulation of the experimental set up, some degree of success in making predictions might be possible. There are, however, upper and lower limits to the contexts that can be constructed and used in practice.

Where a context used to make a prediction is not too severely delimited, and a good job of describing it is done, it is possible to predict the appearance of a future thing with some degree of confidence. The solar system, as described on the basis of Kepler's three laws of planetary motion, and with the addition of the planets discovered since his time, is one of the most successful contexts ever created. Predictions of the future appearances of the planets to observers at any point on the earth's surface made on the basis of these laws are pretty certain to be successful. Nevertheless, still more successful (long-term) predictions should be possible if the predictive context were expanded to include the visible fixed stars. Still larger contexts might perhaps make it possible to predict the sudden appearance of a large meteorite from beyond the solar system or beyond the galaxy that collides with the earth destroying it or knocking into a new orbit.

2.4.6 Probability

In the previous section (4.4.5) predictions of different types have been compared in terms of how likely they are to be successful. In the example of predicting the exact date of the onset of the monsoon, predictions were made for 10 successive years. The success rate was 0.8, or 80 percent. The usual term for 'success rate' is 'probability'. The probability of a correct prediction over a number of years is 0.8. With the prediction 'the sun will rise tomorrow morning at such and such time and in such and such a place' the probability is nearly 1.0. In tossing a coin a probability of turning up heads over a series of tosses will usually be about 0.5.

The concept of probability, thus understood, is a useful tool in the work of validating contexts. From the point of view of the system of primary concepts of this book this is its only use. It is necessary to state this clearly because the term probability has been given another meaning altogether by physicists in the 20th century. Whereas the concept, as defined above,

was developed to describe the outcomes of multiple tests, it is now also being applied to the outcomes of single tests. It is being said that before the completion of a test such as the tossing of a coin, when the result comes to be known as a fact of experience, there was a fifty-fifty probability that it would be either heads or tails. Whether it was to be one or the other was determined, as far as we know, only at the moment the result appeared. Prior to that moment the status of the result is said to be indeterminate. This indeterminate status is abruptly terminated on the completion of the test. Even in theory it could not be said that it would be one or the other. What appears, either heads or tails, is entirely a matter of chance; entirely unpredictable – aside from saying, that is, that the result has a 50 percent chance of being tails, which is really no prediction at all. The upshot is a general conclusion that the future is, even in principle, unpredictable.[13]

In terms of the system of primary concepts being assumed here, and more specifically in terms of the concept of causation assumed, the appearance of things is strictly determined; what appears in a particular test is what has to appear. We cannot know exactly and in detail why a particular thing does appear and is the way it is even after it does appear, but that is no reason for denying that its appearance is strictly determined. The whole of science, the whole of life, is a constant effort to understand as much as we can why things appear as they do. It is an uphill and unending task, and at any one time the most we can hope for is to understand enough to be getting on with.

Notes

1. With physical things, for example, this modification may be thought of as that occurring in the topological deformation of a geometrical figure, as for example, a cup being transformed into a doughnut.
2. This is from the translation by Andrew Matte in Hawking, 2002, pp. 737-8.
3. It is not easy to discard inherited primary concepts even after we have identified them. It is emotionally as well as mentally painful.

One must let go of existing ways of thinking and doing before new ways can be visualised, and the in-between period is one of doubt and insecurity. This is why cultural transformation is such a difficult and contentious process. All this has been extensively documented (Jackson, 2008).

4. In perhaps all ancient cultures the concept that all physical things are organisms is found. Elsewhere I have reviewed the evidence for this in Indian Vedic culture (Jackson, 2013 b, p. 174). It appears in later philosophical and scientific thought in Greek culture (Goldsmith, 1998, p. 116) from where it continued to the late European Middle Ages.
5. 'Creative imagination' is an exercise undertaken in the waking state in the hope of obtaining further insight into the meaning of particular images received in a previous vision. The vision is recalled and then an effort is made not to think about anything. When seemingly random images appear, they are noted and later their possible significance for the original image is pondered. In this exercise the need to conform to the rigid logic of waking experience is somehow set aside, thus clearing the way for the appearance of further elucidatory insights.
6. The position of a moving object, say a meteorite, at any given time is determined on the basis of one experience in which a meteorite is the thing in the experience. From that one given experience it is not possible to determine the velocity of 'the' meteorite. To determine its velocity one must begin with the experience of a temporal community of many prior experiences of 'the' meteorite. From the single datum of a temporal community of 'the' meteorite it is impossible to determine the position of 'the' meteorite at any particular time.
7. This is a mistake that is often seen in traditional, methods of dream interpretation. A black dog invariably means death or a snake is a symbol of a phallus in all cases, and so forth.

8. For a brief history of vitalism see Capra, 1996, pp.124-6. For a discussion of the opposition to mechanism by the Romantics see Whitehead, 1925, Chapter 5.

9. Ultimately Darwin's explanation is not better than Lamarck's because he said that changes in form and behaviour are a matter of chance, a term which he admitted was only a cover-up for an inability to trace the causal relationships leading to change (see Lewens, 2007, pp.43-5). This amounts to saying that scientists who operate within the mechanistic materialist conceptual framework do not have available to them an adequate concept about the nature of causation.

10. For a detailed account of the construction by Kepler of his three laws of planetary motion, see Koestler, 1959, Part IV, Chapter 6).

11. Koestler (1959, pp. 326-7) has quoted this from Kepler's *Astronomia Nova*, Chap. 19.

12. My presentation of this example is based on the paper by P. R. Kanani (2007).

13. The word 'conclusion' as used in this discussion is a misnomer. It suggests that the statement, 'the future is, even in principle, unpredictable', has been reached by reasoning from actual experiences, that is, that it is an explanatory context built up from facts. This is not the case. The statement denotes a context assumed a priori. This a priori concept is obviously that what happens is not a result of what happened before. Since this concept is not recognised and made explicit, it can masquerade as a 'conclusion'. My attention was drawn to this argument by David Shiang's book *God Does Not Play Dice* (Shiang, 2008).

3
Primary Concepts

In this chapter I will list out and describe a new set of primary concepts, an alternative to the set scientists currently hold. The concepts described are answers to the nine perennial questions, that is, questions 1, 2 a to 2 g, and 3 in the perennial questions format (see Box 2.1). However, the order in which these questions and answers are taken up is different from that given in Box 2.1; I have ordered them in a way that I hope will facilitate an understanding of the entire system as quickly as possible. The number in brackets following each heading is the number of the question in Box 1.1 to which the concept is an answer.

3.1 What actually exists? (Question 2a)

I have placed this question and my suggested answer first in the list of concepts because it is the first question we usually ask ourselves: what is it that actually exists? If this question can be answered satisfactorily, the other concepts can more easily be formulated in ways that allow all nine concepts together to form a logical and coherent system.

I am, and I know that I am. In other words, I know that I exist. This cannot be doubted; to assert that I do not exist, I must exist. At the same time I know that I experience things. The experience is of an existent entity; of this I am certain. I cannot, however, say with certainty that the thing experienced is, in itself, an existent entity. Only the I and the experience ultimately exist. The I is the subject of an experience, and the experience itself is the object. For example, 'I see a cow' is an experience. The I who says 'I see a cow' is the subject. The word 'cow' in this statement is the particular thing in the experience. It is the name of the form of the experienced thing.

The I is singular, one and the same in all experiences, for to maintain that the subject of each experience is a separate entity, it would be necessary to objectify and describe it. This is impossible, for the subject of an experience can never be an object with form (that is, a thing) and without form there is no basis for saying that there are two subjects rather than one. The objects that appear in experiences – things – are many, each having a definite form. For convenience in what follows, the I will be referred to as 'the I', while the experiences will be termed 'actual existents'. Actual existents (that is, experiences) are described in this section, while the I is described in Section 3.3.

3.1.1 A world 'out there'

> When you are criticising the philosophy of an epoch, do not direct your attention to those intellectual positions which its exponents feel it necessary to defend. There will be some fundamental concepts which adherents of all the variant systems within the epoch unconsciously presuppose. Such concepts appear so obvious that people do not know what they are assuming because no other way of putting things has ever occurred to them.
>
> (Whitehead. 1929, p. 48)

Let us consider the simple statement, 'I see a mountain'. This statement describes a matter of fact. By the term 'matter of fact' I mean what is indubitably the case; it is the case that there is the experience of 'I see a mountain'. The existence of the experience is beyond doubt.

What can be doubted is whether there is a mountain apart from the experience of a mountain, or in other words, whether the mountain in the experience 'I see a mountain' is itself and actual entity. And yet, this has been insisted on in all schools of philosophical and scientific thought in Western culture over at least the past several millennia. To be more precise, this concept is stated thus: there is a world 'out there' composed of actual existent entities which I 'in here' observe. These entities are thought to exist independently of the I or observer, or of any I or observer at all. The meaning of the expression 'in here' is imprecise; it refers vaguely to the

feeling in a body of a *Homo sapiens* that the I considers to be its own. The I in this particular body is termed a person. What is implied in this feeling, but not made explicit, is that this person exists even in the absence of a world to observe.

Before proceeding further, it is essential that we examine these notions (that is, a world 'out there', and an observer of the world 'in here') critically and decide whether or not they can be considered to be valid or not. Our decision will ultimately come down to what extent we are willing to act on the basis of derivative facts (Section 2.3.2), for there are no actual facts that can be cited in support of these notions.

To validate the context that there is a 'world out there' whether I am observing it or not, it would be necessary to prove that it exists even when I am not observing it, as, for example, when I am asleep. Two facts might be brought forward to support this concept. Both are, however, derivative facts. The first is based on the two actual facts that the world I experienced last night before I went to sleep seems to be essentially the same as the world I experienced on waking up this morning. These two facts can be explained by concluding that there is only one world that continues to exist, even when I am asleep. But this conclusion could be mistaken.

The second derived fact is that when I am asleep there are other persons who are awake and they observe the world at that time. When I wake up and ask them if the world continued to exist when I was asleep, they answer 'yes, I saw it.' It is a fact that I hear them say 'yes, I saw it'. From this fact I conclude that the world always continues to exist, even when I am not observing it. The testimony of these witnesses, however, is inadmissible as evidence because they are part of the world 'out there'. I cannot therefore be certain that they continued to exist when I was asleep. If they themselves did not exist when I was asleep, their saying now that the world existed when I was asleep cannot be considered valid evidence that it did exist. For the same reason I cannot establish beyond doubt that the world existed before I was born.[1]

It will have been noticed that my question in the previous paragraph is not a valid one. It indicates that I am assuming *a priori* that there is one

continuing world by asking 'did the world exist when I was asleep.' Since I am seeking to establish whether or not there is a continuous world, I should have asked, 'did you see a world when I was asleep?' They might have answered 'yes' to this question also. But then I would still have to decide whether that world was the same as the one that I saw before I went to sleep. How am I to decide? I might ask the same persons whether the worlds they saw before I went to sleep and after I had gone to sleep were one and the same world or not. Assume they replied 'yes'. But I am not certain that these people existed when I was asleep, so how can I be certain that what they say is correct? Further, how could they be certain that the world they saw before I went to sleep was the very one that they saw after I went to sleep? Can I be certain that the world I see at present is the same as the one I saw five minutes ago? They are similar, no doubt, but there are differences also. How, then can I say that they are one world? Clearly, I have no reason to say so, and if I do I might be wrong.

Validating the concept that I exist even in the absence of a world is no less problematic. I would have to be able to point to a situation in which there is no world, that is, no objects to observe. Can I ever be certain that there is no world? At most I might suspect that there is no world, but that is when I, the observer, the person, am asleep. For the sake of argument let us say that there is no world when I am asleep. But how could I know that there is no world when I am asleep and not observing? If I am uncertain that there is a world when I am asleep, then how can I be certain that there is not? Let us further say, again for the sake of argument, that there is no world when I am asleep. The next question is then: do I, the person M. G. Jackson, exist when M. G. Jackson is asleep? Does he have any evidence that this is so? Can he ask other people when he awakes if he existed while he was asleep? The people he might ask are, however, parts of the world that, so he has argued, does not exist when he is asleep. If they did not exist when he was asleep, their evidence now when he is awake can have no value.

In the end we can never be certain either that a world exists in the absence of a person who observes it or that a person continues to exist in the absence of a world. We are bound to return the verdict that they do

not. As far as we can ascertain both appear together and disappear together. This is in line with the vision of creation described in Section 2.2.5.

In view of this, perennial question 2a has been phrased differently from the way it is usually phrased. Traditionally, and up to the present time, this question is stated thus: what are the final actual existent entities of which the world is made up? In this book it is phrased this way: what are the final actual existent entities of which experience is made up? This alternative allows for two options rather than only one. These options are:

1. My experiences are of objects in a world out there; and,
2. My experiences are themselves the final, actual entities of manifest existence.

The second option is not available if the question is asked in the traditional way because it presupposes that there is a world 'out there'. The alternative wording allows us to examine both options, which we have done. The verdict is that the second option alone is valid.

What then is 'the world'? It is something that everyone refers to often: 'the world cup football tournament', 'the world is in a mess', 'memories of World War II'. By a repeated sequential integration of individual experiences larger and larger, as well as more and more inclusive explanatory contexts are created. The largest and most inclusive of our public contexts is that we term 'the world'. It is a useful, indeed necessary context, but it is ultimately indescribable in any but partial, relative terms. We err when we think that a world context is an actual existent and not just an attempt to understand phenomena.[2]

We can now consider the problems created by these unsubstantiated notions of a world 'out there' and a person 'in here'. Consider first the problem of defining the I. The I that observes the objects of the world is felt to be 'in here', that is, within the body I consider mine. However, 'my body' is just another object in the world I observe, and I can, and also do, observe my body all the time. Every experience is invariably referred to 'my body'. No matter how interiorly I observe this body, no matter how minutely I observe its parts, I am still observing. Similarly, I observe its functioning, its thoughts, feelings and emotions. However, the I cannot observe itself.

If the I is not an object, then what is it? What is the nature of its relationship to the particular material entity which it says is 'my body'? There do not seem to be any answers to these questions given my initial concept of self-existent material objects 'out there'. At least no one has ever found any creditable answers to them. Logically, of course, there can be no answers. And so, I say, quite lamely, that the I is a non-material 'something' that 'emerges' from the functioning of the material structures that comprise 'my' body. This is, of course, quite illegitimate. If it is asserted that A produces B, where A and B are utterly dissimilar, it is necessary to say how A can do this. This is not said, nor can it be said. By not doing this our system of primary concepts becomes incomplete. A system requires that every one of our primary concepts be defined with reference to every other, but it is not permissible to define one concept in terms of another. When this is done, that concept is not really defined at all. Or, instead of this dodge, the I is simply ignored. It is taken to be no more than a linguistic convention. Instead of 'I am hungry', it is said 'this person is hungry'. This immediately invites the question: 'who says this person is hungry?' The I will simply not disappear or be explained away. We will have to leave these questions for now, but will return to them in Section 3.3).

Coming next to the problem of defining the objects of which the world 'out there' is said to be composed, we find again that a definition eludes us. Early on Aristotle saw that any possible answer that can be formulated involves two correlated concepts, those of matter (or substance) and of form. These concepts are not independent of each other, in that each one presupposes the other. I would not know that there is any matter if it were not formed into discrete units. Form can be known only when it informs something. Christopher Shields, explaining these two concepts, writes: '...matter and form are correlative [concepts]...each one relying for its explication and defence upon the other (Shields, 2007, p. 53).'

Aristotle formulated a fairly robust definition of form. Essentially it was Plato's concept of 'Ideas' or eternal abstract organising templates that are impressed on matter from the 'outside'. However, Aristotle considered that the determinants of form are inherent in the bits of matter that they inform; they are what the matter has become or will become on maturity. (All

objects were considered to be living entities.) Physical form is described in terms of the geometrical relationships of the parts of an object

In contrast, his definition of matter was weak; indeed, matter was not really defined at all. In practice, Aristotelian science fore-grounded the concept of form; matter was taken for granted and given no particular thought (Capra, 2007, pp. 168-9).

In the 17th century the Aristotelian system of primary concepts was replaced by the materialist, mechanistic system. But in this latter system too we find essentially the same problem: one of the two is fore-grounded and the other is lost sight of; in this case matter was fore-grounded and form was pushed into the background.

In the materialist, mechanistic system matter is individuated from the start. It is composed of innumerable minute particles. These particles aggregate to give larger particles or objects, but are in the last analysis not themselves aggregates. Each of the particles is endowed with a form. This form is the totality of what John Locke termed primary attributes – size, shape, mass and motion. These attributes of individual particles are said to determine the attributes of the aggregates of particles.

Our critique of this conception of matter and form must begin with the concept of primary attributes. Whitehead in 1929 pointed out that the primary attributes of particles and objects are actually expressions of relationships among them (Whitehead, 1929, p. 309).[3] In other words, the 'attributes' of shape, size, mass and movement of an object are all expressions of the object's relationships to other objects. In the absence of any other objects, a given object would not have any attributes. There would be no way to describe it at all. For all practical purposes, it would cease to exist. In view of this he concluded that '...the notion of vacuous material existence with passive endurance, with primary attributes, and with accidental adventures...[has] vanished from the field of ultimate scientific conceptions (Ibid).'

Theoretical physicists, however, persisted in their belief in the existence of material particles as the sole, ultimate explanation of what the world is 'really' like. When their experimental results belied this belief, they began

tweaking their inherited definition in various ways in an attempt to salvage it. They said that material particles are really 'quanta of energy', or 'force fields', or 'waves of probability'. As a result, the picture they presented of what they think exists 'out there' became more and more confused. Arthur Koestler commenting on this said:

> How did this situation come about? Already in 1925, before the new quantum mechanics came into being, Whitehead wrote that 'the physical doctrine of the atom has got into a state which is strongly suggestive of the epicycles of astronomy before Copernicus
>
> (Koestler, 1959, p. 543)

(He was referring to the refusal of scientists of that time to relinquish their belief that the Earth is the centre of the solar system and so were forced to postulate a complicated set of epicycles in order to construct a workable model.)

With the creation of systems theory in mid-century, some theoretical physicists began to focus their attention more and more on the patterns of relationships among the parts of systems. One of them, Fritjof Capra, was led to the only possible conclusion to this trend. He wrote that '...subatomic particles are not things but interconnections between things, and these in turn, are interconnections between other things, and so on...we never end up with any things....(Capra, 1997, p. 30).[4] He goes on to propose a view of science as a study of relationships only, ignoring completely the question of what it is that are related. In terms of the Aristotelian critique that has been adopted in this section, these physicists have fore-grounded form (patterns of relationship) and pushed substance (what are related) into the background. Substance (what is related) is tacitly assumed, but no effort is made to say what it is.

Whitehead, accepting the need to define both substance and form, went on to develop the concept that actual existents are experiences, or, as he termed them, 'drops of experience' (Whitehead, 1929). The substance of an experience is the simple fact that it occurs. What the experience *is of* is its form. These statements will be elaborated in Sections 3.1.2 and 3.1.3. The acquisition of form is a definite process that can be described. This will be done in Section 3.1.4.

Earlier in this section it was stated that the concept of a world 'out there', and its corollary of an I 'in here', creates problems in practice. The most conspicuous example of such a problem is that of describing how the I 'in here' comes to know that there are objects 'out there', and what those objects are like. We may well expect this to be a problem when, as we have seen, we cannot define either the I who comes to know or the objects it comes to know.

A simplified account of how knowing is said to occur, given the concept of material entities as actual existents in a world 'out there', is as follows. There is an object 'out there' which emanates or reflects quanta of energy, photons, say that travel through space and strike a human eye. They are then transmitted onwards, or give rise to analogous quanta in the eye which are then transmitted onwards, via nerves to the brain. At this point a radical discontinuity occurs, for it is said that the stirring of the brain into activity by these quanta creates an experience of seeing an object. Objects, quanta, eyes, nerves, brain cells are all physical entities - 'out there'. How these cause the arising of an experience by an I 'in here' of seeing an object 'out there' remains unexplained, and is seemingly unexplainable. The logical discontinuity here is simply ignored. The perennial question about knowing (question 2g) remains unanswered, and thus further weakens the overall system of primary concepts assumed in contemporary global culture.

In the alternative system described in this book there is no problem about defining knowing. To experience a thing in an experience is to know it. This is an example of how a problem simply disappears when we change our primary concepts.

3.1.2 Experiences as actual existents – an introduction

My attention was drawn to the concept of experiences as actual existents by the insight described in Section 2.2.5. This concept has not, of course, appeared for the first time in human thought. However, it was new to me. Later on I read expositions of the concept as developed by earlier writers. And even after I had read them I did not for a long time connect them to my vision. It was only after a prolonged attempt to understand what, in essence,

has gone wrong in Western culture that the likely meaning of my insight emerged. I take its emergence as an instance of the revival of an ancient context that had been sidelined for more than two millennia - because it is needed today.

How useful this concept will prove to be depends, of course, on the skill with which it has been interpreted and explicated. I have interpreted it as having a transpersonal meaning since it seemed to address my long-continued conviction that the chief reason for the dysfunction of our contemporary cultural model is somehow the concept of material atoms constituting a world 'out there'. Further, since the 1920s many other people have also been uneasy about this concept of material atoms, and about the strenuous attempts that are being made to preserve it in the face of evidence that it is untenable. The need has clearly been for an alternative, simplifying and clarifying concept of actual existents, but what that concept might be no one could say.

To my way of thinking this build-up of dissatisfaction with the concept of the material particle during the 20th century, and our collective inability to find an alternative, are the indicators of a grave disequilibrium in the shared system of primary concepts of our time. Such disequilibrium can trigger a major corrective movement. It thus seems to me that the appearance of this alternative concept of an actual existent marks a movement towards greater equilibrium.

I have thus interpreted this insight as suggesting an alternative conception of what an actual existent is. Prior to this I had rejected the concept of a world of actual existents 'out there' as being untenable, as related in the previous section, thus helping to clear the way, so to speak, for an alternative concept.

In developing a detailed definition of what an experience is, how it comes to be, and why it becomes what it does become, the insight itself gives only the most general indications. The details are entirely speculative. They are what are what might be termed a 'likely story'. The general indications from the insight are the following.

1. It indicated that the final experience is the result of the interaction of a subject and an object. This it does by showing the subject, the 'I am', apparently alone in the first stage of the process – an 'I' that longs for its counterpart 'this'. It remains to be explained what they are in themselves and how they arise.
2. It gives the impression that the appearance of the completed experience is the result of a process of some sort – the activity 'behind the scenes' – but offers nothing definite concerning the details of the process.

Given these general indications, I then turned to an examination of experiences themselves in an attempt to obtain further guidance in approaching the task of definition. In the flow of experiences three constant features are evident.

1. When we attend to our experience as such, and not to what is experienced in particular, it is obvious that it is composed of a constant flow of discrete individual experiences. Aside from these experiences nothing at all can be said to exist. Each experience is as 'brief as the wink of an eye', to use an expression of the Hinayana Buddhists. No sooner does it appear than it is superseded by another.
2. There is novelty as well as continuity. Every experience is entirely new, unlike any that went before, and yet it is recognisably similar to earlier experiences.
3. An experience is similar to those that preceded it in that they share a recognisable pattern of relationship among the internal elements that comprise each of them. These patterns continue to be recognisable through a series of similar experiences, but they do change in significant ways.

It is necessary to account for these features in any satisfactory account of why experiences are the way they are. In short, we must attempt to explain the origin of form.

From the foregoing guidelines and requirements a complete definition of actual existents has been constructed. How this has been done cannot

be described inasmuch as there is a good deal of trial and error involved and further subsidiary insights (intuitions and visions). Throughout, logical consistency has been the ideal. Moreover, the definition has only taken final shape along with those of the other definitions that comprise the new system. The success, or otherwise, of any of these the definitions can only be judged by the soundness of the full system as a system (Section 2.1).

An actual existent, that is, an experience, is a created entity; it has a beginning in time. However, it does not have an ending; it continues to exist indefinitely. Only there are two distinct phases of its existence over time. It first exists in the now as a present experience, and then in the past as a karmic seed of itself as it existed in the now. It is alive but dormant and can be activated and thus participate in the creation of new experiences in the future by contributing its form. In this way certain features of past experiences appear in new experiences, creating a sense of continuity. Because each new experience is made up of many previous experiences never before brought together, and because these experiences are combined in patterns that never existed before, each experience is novel. The 'patterns that never existed before' are those dictated by the causal agency which changes from moment to moment. The experiencer of a new experience, the subject or I, becomes a person in the experience as soon as it appears; from 'I am', it becomes 'I am this', and thus its desire to be someone definite is satisfied.

An experience exists in two modes. In the first it is said to be manifestly existent, in that it is a current appearance in the now. As a karmic seed in the past it continues to exist, but is not manifest, that is it is not present in the now of a current experience.

3.1.3 An experience and its form

In any general discussion of science two concepts, both propounded by Aristotle, appear to be indispensible. One is the twin concepts of matter (or substance) and form, the other that of the four causes. And so it is that we turn to these for help in formulating an explanation of experiences,

what they are and how they come to be. The twin concepts of substance and form were considered in Section 3.1.1. We turn now to a consideration of the four causes in relation to the system of primary concepts of this book.

Aristotle said that the form of any entity is the combined result of four different causes: the material, the efficient, the formal and the final. This can be illustrated with reference to the creation of, say, a statue.[5] The material cause is, say, a block of marble. The efficient cause is the artist who sculpts the block into the form of a statue. The formal cause is the image the artist has of a particular man, which he endeavours to render in a visible, tangible form. The final cause is the purpose for which the statue is created – to commemorate a deed of that man at the place where he performed that deed.

The material cause of the form of an experience is the particular selection of experiences from the past which is brought forward to participate in the creation of the new experience. The selection is made in accordance with the requirement that the new experience conform to the configuration of the causal agency at the time the experience is being created. Each individual experience selected is fully defined in terms of form, and the selection process can be seen as the first step in determining the form the new experience in the making will have. Among the multitude of past experiences, four basic types, or primary forms, can be identified. These types refer to the nature of the things that appear in experiences. They are physical, thought, emotional and feeling things. In any new experience the selection of past experiences will be found to have a preponderance of one of these types or another. This concept of four primary types of experiences can be seen as analogous to the early Greek, pre-Aristotelian concept of the four types of substance, earth, water, fire and air.

The expression 'experiences in the past' is rather vague. On passing from the present to the past they, as it were, enter the causal agency, and thereafter abide there. The causal agency, accordingly, may be thought of as having two aspects, corresponding to the two functions it performs. One is that of an archives, where past experiences are filed away according

to their type. Material for a new experience is drawn from this archives. The other is that aspect of the agency that actively determines which experiences will be selected from its archives and how they will be arranged. It compels the individual experiences to conform to the demands of its current configuration. The causal agency exists within each and every experience, and nowhere else

The efficient cause of a new experience is the dynamism of the causal agency per se. It is constantly being reconfigured by the addition of new experiences as they pass from the present into the past, and is constantly compelling new experiences to conform to its current configuration. This dynamism is a manifestation of the tension created by the initial separation of subject and object that leads to their striving to be reunited in a unitary experience. Their striving takes the form of the desire of the subject, the 'I am', to be 'I am something definite, a specific thing in an experience.' The initial separation of subject and object is the beginning of the actualisation of the potential for the creation of an experience that exists prior to its appearance. The primordial force that effects this separation is life.

The formal cause is the particular configuration of the causal agency at the time the experience comes into existence. The final cause is a consequence of the formal cause. Since the present formal cause, that is the present configuration of the causal agency, is the logical outcome of its immediate past configuration, so the configuration that succeeds it will be the logical outcome of its present configuration. Therefore the necessary form of the experience presently being created is already determined before it is created. In a sense, that pre-determined form 'guides' the process of creating this experience in the making. A new experience can only take the form that it must take.

3.1.4 The process of creating an experience

The creation of an experience is the outcome of a definite process. There are three stages in this process. The first is the gathering up of selected past experiences or karmic seeds. The term 'gathering up' is intended to indicate an action that is purposeful and in which the gathered experiences and the gathering subject both contribute equally. That is,

the subject selects the experiences to be gathered up, then reaches out and seizes them, and finally draws them to itself. On their part the selected experiences expect to be selected and so co-operate with the subject by 'stepping forward', as it were, to be selected. They willingly, actively embrace the subject.

'Gathering up' also means that all the selected experiences are brought together in the 'now' of the present experience in the making. This statement is significant because the selected experiences originated in various and sometimes diverse contexts at different times in the past.

Further, the term 'gathering up' implies that some experiences are actively rejected. The subject knows that some experiences are not to be part of the new experience, and so passes them over. The 'passed over' experiences themselves also know that they have no role to play in the formation of the new experience, and so remain aloof.

The co-ordinated action of past experiences and the newly-forming experience is accounted for by the immanence of the causal agency in them all. Therefore at any given moment the current configuration of the agency is known and acted on by all of them.

It must be clarified that a selected karmic seed from the past is not literally removed from the past and transported to the present. If this were so a past experience could participate in the creation of only one new existent. From our observation of the flow of experiences we know that this cannot be so because past existents are clearly discernible in more than one later experience. The transactions whereby a subject grasps an object and draws that object to itself is a physical metaphor for a much more subtle action. The 'grasping' and 'drawing to itself' is a feeling of the subject for the past experience generated by the encounter. The newly-forming experience feels that the past experience is already part of itself, and this feeling is a conduit for the transfer of form from the past experience to the new one.

The gathered-up seeds are then fashioned into a single experience. In this process certain features of the gathered-up seeds are selected, while others are rejected. The selected features are then melded into a unique

new form. This is the second stage in the creation of an experience. The selection and melding are guided by the requirement that the new experience conform to the current configuration of the causal agency operating in the newly-forming experience. In this melding the selected features do not retain the exact forms they possessed in the gathered-up seeds. Those forms are modified as is necessary to meet the requirements of the causal agency. This involves the deformation of the forms of these features, but not their transformation. Further, some features may be given prominence in the final form of the new experience, while others are relegated to the background.(6)

The subject of the creative process, the I, is not overtly involved in these activities of gathering up and melding past experiences. This was made clear in the creation vision itself (see Section 2.2.5). That the I is involved, however, is attested to by its feeling in that insight that some activity is going on 'out of sight' or 'behind the scenes'.

The third and final stage of the process of creating an experience is the 'satisfaction'. The subject of the new experience finds itself in the experience created, a part of a definite thing in an experience which was its desire from the beginning. That desire is thus satisfied.

3.1.5 The togetherness of all experiences

There is a togetherness of all experiences that is not itself an experience, but an innate feature of every individual experience. Without this togetherness no experience could become what it is, nor, indeed, become anything at all.

In the concept of 'the togetherness of all experiences', two distinct sub-concepts must be distinguished. The first is that of the direct interaction of each experience, in the process of its creation, with every experience in the past. This occurs in the activity of 'gathering up' of past experiences in which each past experience is addressed by the newly-forming experience. It is addressed in the sense that it is considered for inclusion in the new experience. Some are selected, others are rejected. Rejection is a definite decision, no less than selection. In the decision to accept or reject, both the past experience and the one that is being newly-formed participate

(Section 3.1.4). This mutual decision-making interaction between experiences brings them all together.

The second sub-concept is that of the causal agency. This determines the outcome of each interaction between a newly-forming experience and a past experience; it explains why some decisions are of mutual acceptance and some are of mutual rejection.

The form of a newly-created experience is determined by the requirements of the current configuration of the causal agency. As each new experience recedes into the past it is integrated into the totality of all past experiences. In being integrated it decisively alters the configuration of the agency. In this way each experience participates in the determination of the form of every subsequently-created experience.

That every experience is immanent in every other was shown in a beautiful insight described by the 2nd-century Roman philosopher Plotinus.

'There' (his expression for what is here termed 'the togetherness of all experiences', past, present and future),

> ...everything is transparent, nothing dark, nothing resistant; every being is lucid to every other, in breadth and depth; light runs through light. And each of them contains all within itself, and at the same time sees all in every other, so that everywhere there is all, all is in all, and each is all, and infinite the glory. Each of them is great; the small is great; the sun, There, is all the stars, and every star again is all the stars and sun. While some one manner of being is dominant in each, all are mirrored in every other.
>
> (Plotinus, the Enneads, verse 8.4, quoted by Sri Krishna Prem and Sri Madhava Ashish, 1966, p. 165)

3.2 What is real? (Question 3)

Experiences come and go in an endless stream. The world contexts and the person contexts we create change from moment to moment. In view of all this it is inevitable that we ask ourselves: is there anything that does not come and go, that does not change or depend in some way on

something else for its existence? In short, is there anything that is real?

This is not a problem only from the standpoint of the concept that the ultimate units of existence are experiences. The materialist too is not spared. In Section 3.1 we concluded that atoms, energy quanta or fields, cannot be said to exist when we are not looking. If they depend upon our looking for their existence, can they be said to be real?

The question, what is real is thus inescapable whatever we assume actual existents to be. We cannot avoid the effort of trying to answer it.

3.2.1 Criteria of reality

To frame any reasonable answer to this question we must begin by specifying what would qualify as real. From the foregoing discussion, three criteria have emerged. These are: 1) what is real requires nothing but itself to exist; 2) what is real always exists; and, 3) what is real is always the same..

In terms of all three of these criteria all actual existents are unreal. For the sake of completeness let us consider each of the two conceptions of actual existents - material particles and experiences - separately. Material particles cannot be said to exist independently of anything else; they cannot be said to exist in the absence of an observer, and thus they fail to qualify as real in terms of criterion 1. They also fail in terms of criterion 2 because they cannot be said to exist when I, the person observing them, am asleep. Finally, material particles do not remain the same over time. An entity can only be said to change in terms of its form, and the form of a material particle is constantly changing, depending upon the larger entity of which it is a part. (It has been shown in Section 3.1.1 that a material particle itself has no attributes; its apparent attributes, in terms of which its form is defined, are forms of relationship with the other parts of a thing in which it participates and to the thing itself.) If a material particle changes, it does not satisfy criterion 3 as well.

Experiences are also unreal since they fail to meet any of the three criteria of reality. An experience does not appear in causal independence of anything else. It comes into existence only because there is an I to

experience it. Further, its form, in terms of which it is known as a discrete, distinctive entity, is determined by the configuration of the causal agency at the time of its creation. For both reasons it is thus unreal in terms of criterion 1.

Next consider that experiences do not always exist. One moment they do not exist, and the next moment they do. Every newly-created experience is absolutely novel, nothing like it ever existed before. It has a beginning in time. It is thus unreal in terms of criterion 2.

Finally, an experience changes over time – in two ways. In the first place it changes its mode of existence. Initially it is an experience being experienced in the now of the present moment; later, it becomes a subtle version of itself existing in the past, a potential participant in the creation of further, new experiences. In the second place experiences change from moment to moment in that the togetherness of all experiences that is immanent in each of them changes. It is thus unreal in terms of criterion3.

3.2.2 Awareness

If experiences, those ultimate actual existents other than which there is nothing, are not real, then what is? Obviously, if there is anything real, it must satisfy the three criteria listed at the beginning of the previous section. Only that which is outside or beyond all experiencing (Sections 2.2.3 and 2.2.5), or the Nothing, satisfies all three. It always exists, and it is what makes it possible for experiences to 'stand forth', that is to exist. Whereas all experiences depend on the Nothing for their existence, it requires nothing else to exist.

In this section the topic of what is real will be approached from a different angle, from a consideration of awareness.

In the thought and speech of present-day global culture awareness of a fact, that is, of a directly experienced thing, is termed consciousness. This occurs in the waking and dream states, and also in insights. Awareness of a situation where there is nothing to be aware of, or content-less awareness, is termed unconsciousness. It occurs in deep sleep.[7] In both cases awareness is qualified. Unqualified, or pure awareness, is awareness of being aware.[8]

There is no subject or object and yet there is awareness. We might say that awareness is of the Nothing – by Itself. Nonetheless, that it is an experience cannot be denied by those to whom it has occurred. It is a type of experiencing not otherwise encountered, an experience *sui generis*. It is not 'my' experience, since there is no I. Nevertheless, a person to whom it has happened has a memory of it when he or she returns to waking awareness. It is, in short, a direct experience of what is real.

Pure awareness has been referred to by many names. Here we have termed it so far as the Nothing. From now on, it will be referred to as 'That Which Is' since nothing whatever can be said about it, except negatively.[9]

3.2.3 The Potential

In the vision of creation (Section 2.2.5) the I am suddenly appears. This event is accompanied by a feeling or thought that 'before' it appeared there was nothing. Or if there was anything, there is no recollection of it after the I am appears. This vague feeling or thought requires, in so far as it may be possible, an explicit explanation.

The concept that an experience emerges from That Which Is (Section 2.2.3) seems likely enough given the creation insight as the starting point. But there is a problem from a strictly logical point of view. How can something come from nothing? This is a problem that ultimately confronts all attempts to explain origins. We have two options: to give up any attempt at explanation, or to allow the directive suggestion of the insight to over-ride logic. I have opted for the latter. My explanation for doing this will take the form of the concept of the Potential.

An experience is created by the interaction of a subject and an object. They are the precursors of an experience; they must exist before an experience can come into existence. The duality of subject and object can only be conceived of as existing within That Which Is. Or, at least, there is a potential for such a duality. By positing an ever-existent potential within That Which Is we avoid thinking in terms of the creation of something from nothing. An experience appears on the activation of this potential.

It will be noticed, of course, that the original logical difficulty has not gone away. It has only changed its shape. Instead of the unanswerable problem, how can something come from nothing, we have, how can That Which Is contain the Potential? By definition That Which Is is nothing and contains nothing.

I derive considerable satisfaction from an ancient insight into the nature of what I am calling the Potential. It is more or less congruent with my own insight (Section 2.2.5). The Indian Vedic god Varun was considered the creator of the universe. He and His role are described and his praises sung in Rigveda Book VIII, Hymn 41 entitled *Varun*. Verse 2 describes his creative role.

> Him altogether I with the song and hymns our fathers sang,
> and with Nabhaka's eulogies, -
>
> Him dwelling at the river's source, surrounded by his Sisters Seven.
>
> (Rigveda, VIII. 41, 2. Griffith, 1896)

In the terminology of this book, the 'Him' who is being praised is the Potential. He dwells in That Which Is, the Source of the river of manifestation. He journey outwards is the experience-creating act. He flows out and an experience appears. Then the flow is reversed; He returns to the Source, carrying the newly-created experience with Him, adding one more experience to His store (the archives of the causal agency) of all previous experiences. He is helped by his Seven Sisters whose work it is to ensure that each actual existent brought forth conforms to the answers to the seven perennial questions 2 a-g) that our system of primary concepts requires.

Let us be clear, however, that the Dweller at the Source never leaves the Source, nor returns to it. How could He? Where would He go? That Which Is is the All-containing. Both the Potential and its actualisation, an experience, are 'contained' within it.

If spatial concepts are misleading, temporal concepts are too. Space and time come into existence only with an experience; they do not exist prior to it – except in potential.

3.3 The subject in experiencing (Question 2f)

The creative outflow that brings forth an experience is a result of two distinct, sequential movements. The first is the projection of the experience that is to be. This process has been described in Section 3.1. The second movement is of identification. The I am in the creation vision desires not only an experience, but also to be a part of an experience – to acquire an identity in relationship with a part of the thing which appears. With the satisfaction of this desire to be one among many, the process of creation is complete. We will now look at this second movement.

3.3.1 The person

A person is not a physical thing, but a high-order thought thing, a context. Like the context 'the world', of which it is a part, it is a convenient way of organising a large number of simpler things that in themselves make no sense, that is, that do not 'hang together'. Whereas the world context is an attempt to explain the objective aspect of experience, the person context is an attempt to explain the subjective aspect of experience. However inadequate these contexts may be in terms of detail, there is no question that they are indispensible to the individual and society.

Having said this, it is now necessary to look at this person context critically, try to understand why it is ultimately so profoundly inadequate. The I is unwilling to remain as it is, an indefinable, formless, witness of the person context. Instead, It compulsively identifies itself with it. It sees itself as the body of a particular *Homo sapiens* context; it is what it thinks of as 'me'. This identification is the cause of immense, endless confusion, doubt and suffering. There is confusion because the person is not a physical thing, but a thought thing, a context. The I, as a person, suffers because the body (the person context) suffers and ultimately dies. And there is doubt because at times there are flashes of insight which suggest that the I has an option not to identify with the person context – and that if it were not so identified there would be a great sense of freedom, and great joy.[10]

The possibility of not identifying is not only suggested in insight, but realised in fact as a definite experience. It is to this that we now turn.

3.3.2 Witnessing

Witnessing is an experience of a singular type that has not yet been mentioned in the development of our story. The subject, I, remains the same as in all other experiences, but there is a subtle change in the object. The form of the object does not change and yet it is different than before. Whereas the I, as a person, sees the person context as himself or herself, as a witness it sees the person context for what it really is, a context. It sees the context as just another part of the thing that is the object at the moment. This does not mean that the I no longer participates in the world context as it formerly did; it continues to think, act, feel, and so on through the person context. At the same time, however, it watches the person context and all its adventures. The pleasures and pains of the person are not its pleasures and pains. For it there is no 'I am pleased', or 'I am in pain', but only 'there is pleasure', 'there is pain'. And withal there is a continuous, quiet joy. In the experience of witnessing the I looks on from 'behind' or 'above' the experience.

The foregoing narrative is an attempt to describe as best I can my own experiencing as a witness. This type of experiencing has come suddenly and lasted for a short time on a number of occasions. It was accompanied by a great sense of freedom and lightness. It has not become permanent, though I feel certain that permanence, that is an unbroken continuity of this type of experiencing, is possible. And there is the testimony of many people that this is so. This possibility has also been suggested by a number of visions, my own and those of others. For example, in hypnopompic vision I have watched the procession of experiences, like one would watch a line of ants marching across the forest floor, my gaze alighting very briefly on one after the other as they passed, and only occasionally lingering a little longer on one particular individual. A traditional, popular story in India, *The parade of the ants* (Zimmer, 1946, pp. 3-11), may well have been suggested by just such an insight. Albert Einstein is reported to have said 'There are times when one feels free....(Personal communication from Alex Hankey, 29/6/2010).' Perhaps an experience such as mine prompted him to say this.

These are some facts concerning the person and the witness. From these I conclude that the witness knows the person, but that the person does not know the witness. If the subject ceases to be a person, it is the witness. The witness is ever-existent but lapses into forgetfulness of itself, as it were, when it allows itself to become a person. If it 'remembers' itself and does not become a person, it remains the witness. It witnesses the experience (the thing experienced) including the part which it no longer sees as a person. That it is both at the same time is attested to by the background feeling that the I, once it has experienced itself as the witness, carries with it through all its experiencing the feeling that 'I am not essentially "me"'.

3.3.3 The detached participant

The notion of detached observation is held up as the hallmark of modern science. This notion is untenable on logical ground since the person context (the scientist) cannot be isolated from the larger world context of which it is a part. In practice this mistaken notion leads to the negative feedback from most modern technology where it interfaces with the natural and human environments. When we 'see' a resource instead of a part of the same entity of which we ourselves are a part, we come to grief. Environmentalists in particular have understood this, and see a need for an alternative conception of the person. A number of proposals have been suggested, but all, in my opinion are inadequate. This is because those proposing them have not gone back to square one to formulate an alternative system of primary concepts but have attempted to find an alternative concept of the person in isolation from the larger system of primary concepts that they assume (Jackson, 2008, pp. 99-101,114).

In this book the concept of detached participation is suggested. A detached participant is constantly aware that he or she is not ultimately a person, but a witness. He or she is thus freed from the emotional hang-ups of the person that spoil so much of our work.

Having come to know that I am the witness through such experiences as those described in the previous section, I recall it now and then in my daily round. The more often I recall this fact, and to recapture the feeling

that accompanied those experiences, the more frequently will I experience fresh experiences of it. And one day, I will find that I am perpetually aware that I am the witness only.

3.4 Who am I? (Question 1)

However much we try, we find it impossible to define the I. Moreover, it is logically impossible to do so. The subject of an experience can never itself be an object; only objects have form and can be described. There seems to be no alternative to saying that the I is nothing at all.

This seems to be a very unsatisfactory conclusion. After all, the I is most essentially who I am. It is present in every experience and never appears to change in the least throughout that series of experiences that constitutes my life history. It seems to be the most real element of my experience, my inability to say what it is notwithstanding. In all cultures in all ages people have felt that that 'my' I is different from my body, though seemingly in my body.[1]

It sometimes happens that the I suddenly disappears, and the thing it is experiencing at the time along with it. Often this is preceded by an intentional effort at detaching awareness from the awareness of things such as that referred to in note 8 (this chapter), practised with the conviction that such an effort can lead to this very outcome. This intentional effort to achieve a transpersonal state of existence is a guarantee that the outcome is not the result of mental disease. Another guarantee is that the Nothing is found to be not an emptiness, but a fullness. The feeling is experienced afterwards that the nothing is, in fact, the very essence of the I. It is accompanied by a feeling of inexpressible peace and joy.

The account in the previous paragraph is based upon the testimony of many people now living, and the artefacts, autobiographies, myths and symbols that our ancestors created in an effort to communicate how the Nothingness came to them and under what circumstances. These testimonies and those of our contemporaries 'resonate' within us, possibly because the Nothing is present 'within' us already, though unrecognised.

From these accounts of encounters with the Nothingness, it seems that they are always brief, lasting from a few seconds to a few hours, and

rarely to a few days. Sooner or later experiencing is resumed. The feeling of the intimate presence of the Nothing, however, persists – in the 'background' so to speak. In attempting to make sense of all this in terms of the system of primary concepts of this book, we will say that the Nothing is That Which Is, an awareness of being aware. It is what alone is real. It contains all that is dependently real, all, that is, experiencing and knowing. Or, if we prefer, we may say that the dependently real subsides in, and then emerges again, from the real. The dependently real is contained within That Which Is.

The last statement immediately raises a logical difficulty. How can That Which Is contain anything? If it contains parts it is then a thing and not nothing. This question has been recognised throughout history in all cultural traditions, in a variety of symbolic statements. These have as their aim helping us to come to terms with the fact that there is no possible logical answer. They point to what is a mystery and what will always remain so, and invite us to contemplate it.[11]

Our speculations might continue in this channel, but I have decided to bring it to a close at this point. However far we pursue it, the basic illogicality will persist. We have to be getting on with our task of construction a reasonably logical and coherent system. Further speculation in this direction will not really help us with this task.

The question who am I is thus answered. Ultimately, it is only That Which Is. When the I disappears, it disappears 'into' That Which Is. But its disappearance is not felt as a loss, but as infinite gain. The I, when it stands forth in experiencing, is a pale reflection or shadow of That Which Is.

3.5 Life (Question 2b)

> The One is perfect, that is it has nothing, seeks nothing, needs nothing, but, as we may say, it overflows and this overflowing is creative.
>
> (Plotinus, *The Enneads*, 5.2.1. Quoted by Sri Krishna Prem and Sri Madhava Ashish, 1966, p. 84)

Life is the energy that powers the creative outflow which culminates in the appearance of an experience. The things that appear in experiences are imbued with this energy. I use the term 'energy' here not in the restricted modern scientific sense of a property of matter (inertia, radiation, force, fields), but in the more general sense of 'she is full of energy.' This is the sense of the original Greek word *energeia*, from *en*, within + *ergon*, work. An analogy is the mental energy I use in the work of finding an effective way to express an abstract idea. In the animist conception of the solar system a planet or moon is said to move by its own inner work; it propels itself. And by extension, all things – electrons, molecules, amoeba, oxen, pea vines, human beings – are all self-propelled.[12] In terms of the symbolism of the Dweller at the Source, we can say that in His journey He uses up His initial store of energy and when he reaches His goal He retires to get recharged.

It is inevitable that an entity or process offered as an answer to a perennial question cannot be explained; explained, that is, in terms of anything experienced. Primary concepts are what are assumed prior to experience; they are the formative elements of experience. Thus we cannot ask 'where does this energy come from', 'how is it created'. Or, if we ask we should not expect any answers. This is why we resort to metaphorical and symbolic statements in attempting to create understanding.[13]

Thus Plotinus' metaphor of overflowing creates understanding by means of our associated thoughts of water and of a confined space in which water collects – until it overflows. To make this metaphor congruent with that of the journeying of the Dweller at the Source symbolism, we could modify it to say that the overflowing is not continuous but periodic, like in a self-emptying tank. When the water level in the tank reaches a certain level, a valve is opened and the tank empties; when it is empty the valve closes and the tank begins filling again. The inflow is constant.

Incidentally, Plotinus' 'One' in the quote at the head of this Section is to be taken as the That Which Is in the symbolism of the Dweller at the Source. There does not seem to be anything in Plotinus' system that corresponds to the concept of the Potential of this book.

To be useful to us in developing our story, it is also necessary to qualify Plotinus' general notion of overflowing in another way as well. The tank does not overflow from the top, on all sides at once, but through an overflow pipe. In other words the overflow must be directed if it is to be productive of definite experiences. More specifically, the flow must be channelled into the production of just that experience that is to be. That experience is already decided before the flow begins by the configuration of the causal agency. In the Rigveda verse, it will be recalled, the Dweller dwells at the river's source. This river is, we might say, the river of life.

3.6 Time (Question 2c)

Time is what orders the sequence of the appearances of things in a temporal community. One event logically follows another in that a given thing seems to be the logical continuation or extension of the immediately preceding one.[14] Neither time nor logical continuity can be understood in the absence of the other.

The phases of the process of the creation of an experience may also be thought of as a temporal community, the phases being organised in a logical progression. While the phases of this process are not experienced individually, the process, as a whole is experienced – as an activity 'behind the scenes' (see p. 50). The existence of phases is inferred; in the terminology of this book they are a species of derivative fact.

Time therefore does not exist in the absence of a succession of appearances of things. My experience of the 'passage of time' arises from my experiences, it is mine alone, just as the world experienced by me is my world alone. As there is no identical world for all experiencing subjects, neither is there a common timescale.

The experience of a temporal community gives rise to the expectation that that temporal community will be continued in the next experience. Or, more simply, the thing now experienced will continue to appear in the future.

In the successive experiences in a temporal community, the relative positions of various parts of the things experienced change, in some cases

slowly, as for example a continent in an Earth thing, and in other cases rapidly, as for example a shooting star in a night sky thing. In other words, the parts 'move'. If a given part of a thing is seen to move in a regular, repetitive manner its relative motion forms the basis for portioning what is otherwise only a vague sense of the passage of time. In other words, a repetitive movement, such as that of the sun in relation to the horizons, becomes a basic metric.

To ensure that there is no confusion about the concept of motion described in the previous paragraph, it must clearly be understood that no thing or part of a thing moves. There is only the appearance of motion created by the similarity of things in a temporal community. A thing appears only fleetingly and during that appearance and neither changes nor moves.

So far we have been concerned with how the past enters into the future. At the same time it was said that a new experience becomes what it must become. This implied that the future determines the present no less than the past does. To be more precise, the forms of future experiences also enter into an episode of experiencing. Here, we come up against yet another paradox. Time, we say, 'flows' from the past through the present to the future, and yet a present episode of experiencing is merely the actualisation of an experience the form of which has already been determined. This is the meaning of what was said earlier that an experience becomes what it must become. The future causes the present as much as the past. The future guides every stage of the current process of an episode of experiencing - gathering up, the melding of forms, and the final satisfaction. The totality of the past and of the future constitutes the bundle of possibilities for the determination of an experience, and places limitations on just which of these possibilities will find final expression and how these possibilities and limitations are effectuated by the causal agency.

It has been said that the forms of future experiences are determined before those experiences actually appear. In addition, those future experiences are sometimes 'previewed', as it were, before their appearance in the logical course of events. Such previews are often vague, but sometimes occur in considerable detail. Instances of this are premonitions which occur in the

waking state. These generate the feeling that something definite will happen, but usually not exactly what. For example, people get the strong feeling, unaccompanied by any definite reason, that they should cancel their booking for a seat on a plane flight, do it, and later learn that the plane crashed, killing everyone on board. Here the future entered into the present in a vague but pertinent way.

Omens are more specific premonitions; the nature of a future disappointments and disasters. These omens are the sudden realisation that a particular thing experienced carries a potent symbolic message in addition to and beyond its mundane significance. That message must be appropriately interpreted to be useful.

Pre-cognitive dreams and visions are more vivid and detailed previews than premonitions. However, these are seen for what they are only later, sometimes years later. They are seen as purposeful when the previewed events actually happen, and as decisive turning points in the person's life. Well-known examples are the sinking of the Titanic, seen by some people in advance, and Abraham Lincoln's dream of seeing his dead body lying in state.

Some premonitions and pre-cognitive dreams and visions can be seen in retrospect as having ensured the health, or even the continuation, of a community. Whatever the specific result, the trajectory of the particular thread of temporal existents is altered. The cause of such alterations must be considered to be the need of the causal agency for crucial change in its configuration in order to regain or retain a tolerable balance.

An episode of experiencing has been said to be as brief as a wink. It is not, however, temporally dimensionless since it is possible to conceive of it as occurring in stages. There is also a feeling of duration. We cannot hold that feeling, though, for even as we try to hold it, it slips away into the past, and is replaced by the feeling of a fresh duration. This feeling of a definite, if elusive, duration is termed the 'now'. In this sense, all experiencing is in the now. As a mere feeling of duration divested of the content of the specific experience that accompanies it, all 'nows' are identical.(15)

3.7 Space (Question 2d)

The parts of physical things are 'spread out' or disposed 'here' and 'there' in relation to each other. Space, then, is simply a system of relationships among parts of physical things. These relationships are described in terms of the distances between parts and the directions of one part from another. It can also be said that space is necessary to the delimitation, the individualisation of things, as well as the parts of things. There is no space outside experiences. With thought things where a concept is represented by an image of a physical thing, that thing similarly exhibits extensive relationships among its parts. Thus a mandala or a pyramid, for example, or an archives or a forest, when it represents a concept, is spatially articulated. Emotions and feelings are singular, without parts. They do not, therefore, have extensive relationships within themselves. Nevertheless, they are usually referred to a body which does have spatial dimensions. Thus, the shock of bereavement or the joy and relief on finding a lost child are felt in the region of the solar plexus. The burnt finger is my burnt finger.

The metric of space is the difference in the distance between two selected (similar) parts of a physical thing that are differently placed in relation to one another in two successive experiences of a temporal community. In practice, this distance may be too small to register over two successive experiences but only over several successive experiences. Thus, for example, the movement of the sun in relation to the position from which I observe it in two successive experiences is too small to register (feature in a separate experience). The movement over a complete cycle of day and night does, however, easily register. Assuming that the two experiences – the beginning and ending of a cycle – refer to a person on a globular earth, rotating in relation to a stationery sun, and by means of several calculations, the basic metric of distance becomes the circumference of the globe earth. This, when divided into a number of equal units, becomes the practical metric for use in all situations.(16)

A further comment on the relative motion referred to in passing in the previous paragraph is necessary. In the experience of a temporal community in which the parts 'move', they are said to do so because their positions in relation to one another change. Two features of these changes must be

noted. First all such changes, considered over the span of a temporal community are determined by the conformation of the form of each one of the things that appears in the community to the configuration of the causal agency at the time it originally occurred. This is as true of the trajectory of the ball I have just knocked for a six as it is of the dance of dust motes in a shaft of sunlight in a darkened room. It is also true in cases where the rate of change is variable, as in the velocity of a planet in its orbit around the sun. The regularities in the movements of parts of things in a temporal community are a manifestation of logical continuity (see Section 3.6). Also, the pattern of the changes in the relative positions of the parts of things, where those movements are repetitive, is one determinant of the form of that community.

A second feature is that only the parts of a thing move. The observer of the thing with its moving parts, that is, the I, never moves because it is not a part of the thing – really. It identifies itself with a part and so becomes a person, but as we have seen in Section 3.3, as long as it feels itself to be that part, to be in that part, it can never see that part in its entirety as it sees the other parts of the thing. Thus I may say 'I feel myself moving' but that I can never see that 'myself' moving. The I that says 'I feel myself moving' is unmoving.

This argument is related to the fact, already discussed (in Section 3.3), that the I, the subject of an experience, can never be an object. And so it cannot be known to itself. It tries to do so by identifying with the part of a thing, but that effort can never fully succeed. In the end, it stubbornly remains itself – the subject. And it is ever unmoving.

3.8 Causation (Question 2e)

> One whole governs the moving and the stable, that which walks and flies, this variegated creation.
>
> (Rigveda, 3, 54, 8; Miller, 1985, p. 4)

In coming to grips with the concept of causation being suggested here it is necessary to understand that there is no specific or direct causes. In other words, one event does not cause another; no event occurs as a result of the prior appearance of any other particular event, nor does it not occur because some other particular prior event did not occur. Looking only at events themselves and their order of occurrence the most we can say is that the relationship of an event to a prior one is that of 'logical continuity' (see Section 3.6).

We can rephrase this argument in a more general way by saying that there are no causal relationships whatsoever at the manifest level of existence. The appearance of an event and the exact form of that event are both determined by the unitary, common, causal agency operating within all events.

The concept of the causal agency being assumed in this book is an instance of the general notion of causation as immanent. Whitehead has defined this notion in the following way.

> ...the order of nature expresses the characters of the ... things which jointly compose the existences to be found in nature. When we understand the essence of these things, we thereby know their mutual relations to each other...[the doctrine of causation as immanent] presupposes the essential interdependence of things.
>
> (Whitehead, 1933, p.116)

In our system of primary concepts, as we have seen, the parts of a thing have no innate attributes or 'essence'. They acquire attributes, and thereby identities, by their participation in the thing. Those attributes are descriptions of their relationships to the other parts of the thing and the whole thing. In describing the attributes of the individual parts we are at the same time describing the system of relationships among the parts.[17]

Thus in describing the planet Earth in terms of its orbit around the sun – size and shape of its orbit, its distance from the Sun at any given point of its orbit, the time taken for one circuit of the Sun, and in relation to the orbits of the other planets around the Sun – we describe the nature of the system of relationships among all the bodies that compose the solar system. In describing the system of relationships, one is also describing the planets that constitute the system. It is important to remember that this way of describing the planet Earth is not a matter of preference, not one among

multiple options, but an absolute logical necessity; the planet Earth has no attributes save those that at the same time a description of its relationships with all the other members of the solar system. In isolation planet Earth is indescribable.[18]

In Western cultures the concept of causation as immanent has never been developed systematically, though it is certainly implied in the thinking of the 17th and 18th century Romantic poets and philosophers (for an example, see Box 3.1. Goethe on Nature), the vitalist view (Driesch, 1908), the Gaia theory (Lovelock, 1979), 'radical inter-connectedness' (Selby, 2002), the 'implicate order' (Bohm, 1980), 'deep ecology' (Oppermann, 2000), the Gaian process (Goldsmith, 1998), 'morphogenetic fields' Sheldrake, 1988), 'Nature's farming' (Howard, 1940) and 'Natural Farming' (Fukuoka, 1994). It has, however, been given considerable attention in traditional Indian Vedic culture (*Rta*) and in Chinese Taoist thought (*Li*). The language in which it is described is almost entirely metaphorical and symbolic, as, for example, the quotation at the head of this section. These descriptions give us a 'feel' for the concept and are a good starting point for understanding it. We must, however, attempt to describe this concept, in as far as possible, in the language of discursive thought and speech. In other words, we must convert it from a general notion to a definite concept, and so render it usable in scientific thought.

To begin then, I will quote two authorities who have made attempts in this direction. The well-known historian of Vedic culture, G. C. Pande has described *Rta* in the following words :

> It would be natural to seek the content of *Rta* but the quest would be doomed to failure because *Rta* is...neither a single law or form nor any system of laws or forms. It is rather the ultimate presupposition of all specific types of order or systems of laws..., itself not a limited form but a whole that is self-determined and self-expressive in infinite variety.
>
> (Pande, 1990, p. 25)

The historian of Chinese science, Joseph Needham, describes *Li* in this way:

Box 3.1. Goethe on Nature

'The German Romantic poets and philosophers returned to the Aristotelian tradition by concentrating on the nature of organic form. Goethe, the central figure in this movement, was among the first to use the term 'morphology' for the study of biological form from a dynamic, developmental point of view. He admired nature's 'moving order'...[and] conceived of form as a pattern of relationships within an organised whole - a conception which is at the forefront of contemporary systems thinking. "Each creature," wrote Goethe, "is but a patterned gradation...of one great harmonious whole." The romantic artists were mainly concerned with a qualitative understanding of patterns, and therefore they placed great emphasis on explaining the basic properties of life in terms of visualised forms. Goethe, in particular, felt that visual perception was the door to understanding organic form (Capra, 1997, p. 21).'

Elsewhere Goethe has given a beautiful poetic description of this patterned whole. 'Nature! We are surrounded by her, embraced by her - impossible to release ourselves from her and impossible to enter more deeply into her.... she creates ever new forms; what exists has never existed before; what has existed returns not again, everything is new and yet always old. We live in her midst and yet we are strangers to her. She speaks constantly with us but betrays not her secret to us. We are continually at work upon her, yet have no power over her.... she is forever building, forever demolishing, and her workshop is not to be found.... she is the sole artist.... (Stone, 1971, p. 52).'

> *Li*, then is rather the order and pattern in Nature, not formulated Law. But it is not pattern thought of as something dead, like a mosaic; it is dynamic pattern as embodied in all living things, and in human relationships and in the highest human values.
>
> (Goldsmith, 1998, p. 215)

A similar attempt of my own is the following.

> The creation of actual existents is an orderly process, and there is also order in the inter-relations among existents. Moreover, the order thus exhibited in diverse elements of manifestation is singular; that is to say, none of the elements exhibits and order exclusive to itself; or an order exclusive to any group of elements, whether in the past, present or future. This overall system of causal relationships is not a static entity, but a living, ever-changing, evolving being, modified every moment by the results of the working out in the fields of experiencing of the set of possibilities and limitations it defined the moment before.
>
> (Jackson, 2013 a, pp. 142-3)

The concept of causation as immanent, as formulated in these quotes, seems to have the following three features.

1. The concept is of a dynamic living entity and not of a blueprint or a template.
2. This entity is a single process informing all manifest entities and determining their forms.
3. This entity lacks specific content and so its form cannot be described.

I believe that a considerable advance beyond these efforts is possible if we:

1. could specify what it means to say that the causal agency is a living entity (feature no. 1 above);
2. attempt to describe the process (feature no. 2 above);
3. and, contrary to conclusion no. 3 above, show that it does have content, and what that content is.

What does it mean to say that the causal agency is a living entity? Not much need be said in answer to this question in view of what has already been said concerning the concept of life (section 3.5). The Potential, is imbued with life. In its actualisation mode this life manifests that energy which powers the entire creative outflow. Every actual existent (experience) is created and sustained by this energy throughout its career. The causal

agency is an innate feature of every existent. But whereas the existents are multiple, the causal agency is single. This is an elaboration of what Whitehead means when he says that 'the order of nature expresses the characters of the...things which jointly compose the existences to be found in nature.' What is an abstract notion in this statement of his has now become a clear-cut, definite concept. It is also implied in Edward Goldsmith's term 'the Way' (Goldsmith, 1998).

In order to describe the causal process (item 2 of the above agenda) meaningfully it is necessary to take up the topic of the content of the causal agency (agenda item 3) next. The content is the totality of all past and future experiences. At first sight it appears that with these statements we are headed for insuperable logical difficulty. On the one hand it is said that the causal agency is an innate feature of every existent, and on the other that all existents, in their unmanifest mode, are 'contained' in the archives of the causal agency. However, this is not really a problem. In speaking of an archives we are being forced to use a spatial metaphor for want of any way of describing it more directly. When we cannot avoid the use of metaphors (and symbols) we must be content to use them in order to be able to get on with our task.

In an archives there is a system of separate storage spaces – racks, shelves, bins and folders in which items can be stored according to topic - and a system for locating and retrieving them quickly. In the archives of the causal agency experiences are classified in several different ways and at the same time are cross-classified as well. The primary classification of an experience in the archives after time is in respect of the primordial theme that informs it. Secondarily it is classified in respect of its process-created theme (context). At the same time an experience is also classified according to the type of experience it is: waking, dream, or insight. These latter folders do not have restricted access for, as we have seen, in the construction of new dream experiences past and future waking experiences are often used, and a waking experience can and does use past dream experiences (as for example when trying to understand a dream the next morning). Finally, we may visualise a classification according to whether the experience features a physical, mental, emotional or feeling thing.

Here too access is not restricted. We have seen, for example, how a physical thing can be brought forward and used symbolically in creating a current thought thing.

One clarification is vital at this point. Primordial themes are contained in the archives of the causal agency. But they are not stored *per se* in separate folders – or in any folders at all. Primordial themes can only be contemplated in abstraction from the experiences they inform, but they do not exist apart from them.

And further, a cautionary word must be offered in respect of the entire concept of an archives. As a metaphor it is useful, but limited. It suggests a more or less static entity, whereas the causal agency is a intensely dynamic living being. Every experience that it contains is received into its unity and instantly integrated into itself. In terms of this metaphor of a living being, the experiences that are received into it lose their individuality and become parts of the whole. Thereafter, they derive their identity from their role in the whole. Come to think of it, they never had an independent identity in the first place. No doubt they seemed novel when created, but that novelty was the logical outcome of what went before, even though that potential novelty had not been actualised. Once actualised, an experience feeds back into the process, modifying the existing configuration of the agency, destabilising it, we might say, forcing it to undergo structural modifications in order to accommodate the new experience and stabilise itself again. This actualisation of itself in manifest form, the receiving back into itself of that actualisation, and the consequent readjustment of its own form, repeats endlessly.

With this paragraph, the third task of describing the process of the causal agency (agenda item 2 above), insofar as it is possible to do so, has been completed as well. Only one further comment occurs to me. And that is that the form of the causal agency is the ultimate and only Form. The forms of the myriad experiences that come into manifest existence are simply facets of this Form, and at the same time are the means whereby it continually re-forms itself. The Form is indescribable, because

unmanifest. Therefore it cannot be known or described in any determinate way. It is, however, necessary to our story.

The topic of what exactly primordial themes are needs to be considered before winding up this section. Primordial themes, or abstract organising principles, are of various types.

1. One type is numerical. In this I include: numbers, conceived in the Pythagorean sense of geometrical units (Burtt, 1924, p. 42); numbers used in an abstract sense of duality, seven-fold-ness, and so on; and also numbers used in a symbolic sense as in Plato's vision of triangles in Section 2.2.4; ratios of numbers, as for example in the golden spiral and the golden rectangle.
2. Colours and notes in the musical scale are also primordial themes.
3. Another sort of primordial themes are pairs of opposites like 'above' and 'below', 'right' and 'left', 'positive' and 'negative', 'male' and 'female', 'extroverted' and 'introverted', in literal and symbolic forms.
4. Psychological themes of the sort C. G. Jung identified and termed 'archetypes of the collective unconscious' (the 'mother figure', the 'anima' and 'animus', and so on).
5. Finally there are the ultra-abstract themes like 'beauty', 'freedom', 'justice' and 'fate'. For an example, see Box 3.2 *Beauty*.

These themes are the primary determinants of the forms of experiences. By 'primary' I mean to indicate that a theme is infinitely flexible in its expression in any particular experience. This is necessary because in the creation of a new experience they must interact with other themes and, further, all the themes involved in the final form of a given experience must adjust to the demands of the causal agency in that experience.

3.9 Knowing (Question 2g)

When I say 'I know this thing' I am referring to the outcome of a two-stage process. First there is the appearance of a thing in awareness. That is an initial experience, as this term has been defined in Section 2.3.2. Immediately following this there is the construction of a low-order context

Box 3.2 Beauty

'What Socrates [in the *Phaedo*] intends to explain [in connection with his 'Ideas' or 'Forms'] is what we have learned from Aristotle to call "formal" causality, but has no technical terminology ready to hand and therefore makes his meaning clear by examples. If we ask *why* something is beautiful, we may be told in one case, "because it has a bright colour," in another "because it has such-and-such a shape." The point that Socrates wants to make is that such answers are insufficient. There must ultimately be one single reason why we can predicate the same character, beauty, in all these cases. Having a bright colour cannot be the cause of beauty, since the thing we call beautiful on the strength of its shape may not be coloured at all; having a particular shape cannot be the cause of beauty, since we pronounce things which have not the shape to be beautiful, on the strength of their colour, and so on. Hence Socrates says he rejects all these learned explanations and sticks to the simple one that universally the reason why anything is beautiful is that "beauty" is present in it," or that it "partakes of" beauty (Taylor, 1926, p. 202).'

in which this initial experience is combined with another recurring but unfocused experience 'I am aware'. The result is the statement 'I am aware of this thing' (section 2.3.2). With acute observation this process is visible.

A third stage occurs when the I identifies itself with a part of the thing observed, that is, when it becomes a person. The person says 'I, such and such a person, know this thing.' There are five modes in which the I, as a person, becomes aware of things. These are seeing, hearing, smelling, tasting, and feeling. The statement 'I am aware of this thing is accordingly modifies to 'I see this thing', 'I hear this thing, and so on. Often seeing, hearing and so on occur in rapid succession. These differing modes of knowing are integrated into a multi-mode context of, for example, 'I see this person in front of me and hear her speaking.'

On the basis of this definition the process of 'knowing', or of 'coming to know', will be termed simply 'coming to know'. This is somewhat awkward

but is necessary in order to distinguish the process of coming to know as conceived in this book from the term 'perception' used at present in everyday life and in scientific discourse. The term 'coming to know' also subtly conveys the message that the transaction 'coming to know' is between the thing that appears and the I, and not between what appears and the person. The person and its sensory powers is a context (the person-context) that is constructed subsequent to the 'I come to know', and subsumes it. Thus 'I come to know' is fundamentally different from 'I, such and such a person, come to know.' With the former the question *how* a person comes to know is irrelevant. This is an example of how a question simply disappears when we change our primary concepts.

Whatever is known is certain knowledge. A thing in an experience is known instantly and completely. What is not experienced cannot be known. To the person who comes to know, the thing known may seem unintelligible and hence meaningless, but that is simply a failure on his or her part to construct a meaningful context subsequently. In itself, the thing is neither meaningless, nor meaningful. It is simply what it is.

Consider, for example, the appearance of a long-dead human being in a waking experience. We may term this experience of seeing this human being, including seeing or hearing what he or she says and does, an insight (a vision imposed on a waking experience) or an hallucination. The term 'hallucination' means that the experience is untrue, since there is not 'really' a human being there – and much less a long dead human being. That is, it is not a physical thing in a waking experience. But how can we set up a thing in a waking experience as the standard of what is true? By that standard of judgement, would a vision insight of the figure of a known but long-dead human being used as a symbol be an hallucination, albeit a potentially very useful one. An hallucination is only such to one who fails to understand that this appearance will have been called forth to serve some definite need, and that with intelligent interpretation its purpose may be recognised. That purpose may be found to be, say, to show the key to the development of an important scientific concept, and/ or it may lead to the resolution of a personal emotional dilemma. Whether we term it an insight or an hallucination, its worth is ultimately to be determined by how

skilfully it is interpreted and built into a testable context. Success in doing this, as indicated by the outcome of our testing, does not, however, make the initial vision or hallucination 'true', but only useful.

Even knowing based on a context that incorporates derivative facts is certain; that is, all the facts that have been integrated into the final context are certiatin. However, the facts derived from supposition or the testimony of others (section 2.3.2) might render the context misleading in practice. To guard against being misled, predictions based on this the context must be tested. Only if the predictions are realised will we gain confidence in the context. Again, 'truth' and 'falsity' do not enter the picture at all. To say that a particular item of knowledge is true or false we must have a standard of truth against which we can compare it. In this system of primary concepts, and in particular with the definition of coming to know, that has been adopted, there is no such standard, nor can there be one.

One further contrast between the definition of coming to know in this book and that of contemporary global culture needs our attention. It will be evident that in the system of primary concepts being developed here there is no place for memory as a separate category of knowing. All gathered - up past and future experiences in the process of creating a new experience are memories, since the term memory means the 'recall' of previous or future experiences. Equally, one might say that all knowing is based on memory.

The flow of 'memories' is automatic and unending. It occurs, for the most part, with no awareness of trying to remember some particular experience or other. Where there is an experience of 'trying to remember' a particular past experience, followed by its appearance as a subsequent experience, it by no means follows that the latter is caused by the former. Rather, both are caused by the necessities of the causal agency. There is no one who remembers, but only remembering.

In the concept of coming to know formulated here there is a distinction between the knowing of a person and that of the witness. The forgetfull who compulsively identifies with an experience cannot be said to have a complete knowledge of that experience. His or her knowing cannot lead to

a complete knowledge because what he or she knows lacks a larger context. Such a larger context is that of the witnessing of the knowing of the experience. What exactly is known when the knowing of the experience is witnessed cannot be described; it can only be experienced. Once it is experienced, it amounts to the revelation of an unsuspected vista, of entirely unexpected meaning. In such knowing there is joy. In the limited knowing of the forgetful I there is, sooner or later, only confusion, disappointment and sorrow.

Notes

1. I came across this argument in K. L. Sharma's book *Maha Yoga* (Sharma, 1937, p. 51).
2. A person's world context changes from experience to experience, and also differs from the world contexts reported by others. It is necessary to integrate these further in order to ensure consistency of individual action and the co-ordination of collective actions. This further integration is a model in which each individual world context is seen as a relative view of, or standpoint within, a single larger context.
3. I paraphrase Whitehead here since he was using the terminology of his system.
4. Capra is using the word 'thing' in its usual, everyday sense of object, and not in the technical sense it is being used in this book.
5. I have taken this example from Shields (2007, pp. 42-3).
6. In this account of the process I have more or less followed Whitehead's account in *Process and Reality* (Whitehead, 1929).
7. When it is said that in deep sleep there is awareness of nothing, the nothing means the absence of the things that appear in waking, dreaming and insight. There is an awareness that there are no things. On waking there is a memory 'I did not experience anything'. Now if there is a memory, that is an experience in the past brought forward

to the present, it is of an experience. Deep sleep consists of a series of 'blank' experiences. A blank experience is one in which, at the gathering up stage, no past experience is selected. All past experiences are rejected. The satisfaction of such a blank experience is a merciful respite from the day's flow of 'full' experiences, and from dream experiences as well. A good night's sleep is indeed a pleasant experience.

8. Take a small object, say a stone, in your hand and look at it steadily. In addition to being aware of seeing the object, be aware that you are aware of the object. Now remove the object from sight and continue to be aware of being aware. Awareness is then aware of itself. (This experiment was taught to me by Sri Madhava Ashish.) This awareness of being aware sometimes occurs spontaneously to someone in one of or another of the three states of waking, dreaming and sleeping. It can also occur by a persistent effort to dissociate the I from the parts of things in experiences with which it identifies itself.

9. Coomaraswamy (1993, p. 63) claims that the term 'That Which Is' was coined by Parmenides. It appeared later in the *Confession of St. Augustine* (Underhill, 1911, p. 331).

10. Joy is to be distinguished from pleasure or happiness. These latter terms refer to emotions that depend on things, whereas joy is independent of things. It persists through experiences of pleasure and pain, happiness and unhappiness.

11. This is the so-called problem of 'wrinkles'. 'Sri Krishna Prem is reported (by Sri Madhava Ashish, personal communication) to have said that we should not expect to devise a wrinkle-free system. Like the carpet with a wrinkle in it, you can try to smooth it out, but all you succeed in doing is to push the wrinkle about; you never get rid of it. The best system we can devise is almost certain to have one or more wrinkles – that is illogicalities that cannot be removed or questions that cannot be answered. There are several in the system being described in this essay. We must struggle to minimise their number, and then hope for the best. And be vigilant subsequently. It helps to some extent to know that some of our wrinkles were also encountered by earlier systems builders (Jackson, 2013, p. 58) '.

12. It must be remembered that the statement 'an electron is self-propelled' is a short-hand expression for 'the electrons in a series of experiences (a temporal community or context) are seen to be in a different position in relation to other parts of the (similar) things in each successive experience.' They seem to be one and the same electron in all the experiences, and it is thus said that 'the' electron moves. The work done is that of creating the temporal community in which this phenomenon of a moving electron occurs.

13. 'Understanding' here does not mean placing a thing in a context of logical relationships, but rather of 'grasping', which is a feeling thing.

14. Logical continuity is an aspect of the overall orderliness of manifest existence. Creating and maintaining this orderliness is the work of the causal agency.

15. This and the previous six paragraphs have been taken, with slight changes, from my earlier book A Return to the Perennial Questions (Jackson, 2013, (pp. 134-6).

16. This and the previous paragraph have been taken, with slight changes, from my earlier book A Return to the Perennial Questions (Jackson, 2013, p. 132).

17. The alternative concept of causation is that of causation as imposed adopted by Newton in formulating his laws of motion. In Whitehead's formulation of this concept the existences which are the ultimate constituents of nature are related only externally. 'The character of each of these ultimate things is thus conceived as its own private qualification. Such an existent is understandable in complete disconnection from any other existent: ... it requires nothing but itself to exist. But ... there is imposed on each such existent the necessity of entering into relationships with the other ultimate constituents of nature. These imposed behaviour patterns are the Laws of Nature. But you cannot discover the natures of the relata by any study of the

Laws of their relations. Nor, conversely, can you discover the laws by inspection of the natures (Whitehead, 1933, p. 117).' This is the notion taken up and developed in the 17th century as the basis for all scientific thinking.

18. It is necessary to remind ourselves that a description of the planet Earth in terms of its parts, while valid as a description, cannot be used as an explanation of why it behaves the way it does in relation to the other bodies in the solar system. In the context of the solar system, the Earth has no identity except in relation to all the other bodies individually and collectively.

4

A New Protocol for Science

This Chapter is divided into three sections. In Section 4.1. The protocol being observed by present-day scientists in one discipline in conducting their research and into which students in this field are inducted, will be made explicit and scrutinised. My aim in doing this is to demonstrate that in following in the footsteps of earlier investigators in respect of objectives, methods and ways of interpreting results, scientists are following an unwritten protocol, that that protocol can be clearly articulated, and finally that the primary concepts tacitly presupposed by that protocol can be uncovered.

My aim in the second section (4.2) is to articulate as clearly as possible, and in as much detail as seems necessary, a protocol for conducting scientific research constructed on the foundations laid in Chapters 2 and 3. A distinction will be made between a general protocol that governs all research in all fields and specific protocols that are derived from it which govern research in particular fields.

Given our present ways of thinking about and doing science, on the one hand, and the new science protocol to be described in Section 4.2, on the other, the problem of how we are to change our outlook from one to the other will be considered in the third part (Section 4.3). Letting go of an existing, entrenched protocol, and firmly grasping a new one is, for a community of scientists in any discipline, fraught with confusion and intense debate, not to say conflict. Even after a new protocol has gained general acceptance it is not easy to act decisively and consistently in terms of it; habits of thought implanted in childhood and nurtured through years of formal education are difficult to change. In view of this I will, in Section 4.3, attempt to show how this transition from an old to a new protocol can be made easier, and indicate how much, if any, of the knowledge acquired

using the old protocol can be salvaged in building an entirely new body of knowledge following the new protocol.

4.1 A scientific protocol in action

As an agricultural scientist trained in mid-twentieth century and having pursued a career of research, teaching and research administration in the 1960s and 70s, participating in the apotheosis of modern agricultural science, the so-called green revolution, I can speak from first-hand experience of the scientific protocol in this field. I will do this by quoting some passages from my favourite textbook during my student days, Sir John Russell's *Soil Conditions and Plant Growth*, first published in 1912 and subsequently revised many times by him and his successors. These passages are from Chapter 1 entitled 'Historical and Introductory' of the eighth edition (Russell, 1955).

> There was an extensive literature on agriculture in Roman times which maintained a pre-eminent position until comparatively recently. In this we find collected many of the facts which it has subsequently been the business of agricultural experts to classify and explain. The Roman literature was collected and condensed into one volume about the year 1240 by a senator of Bologna, Petrus Crescentius, whose book was one of the most popular books on agriculture of any time, being frequently copied, and in the early days of printing, passing through many editions.... Many other agricultural books appeared in the fifteenth and early sixteenth centuries, notably in Italy, and later in France. In some of these are found certain ingenious speculations that have been justified by later work. Such, for instance, is Palissy's remarkable statement in 1562: 'you will admit that when you bring dung into the field it is to return to the soil something that has been taken away.... When a plant is burned it is reduced to a salty ash called alcaly by apothecaries and philosophers.... Every sort of plant without exception contains some kind of salt. Have you not seen certain labourers when sowing a field with wheat for the second year in succession, burn the unused wheat straw which had been taken from the field? In the ashes will be found the salt that the straw took out of the soil; if this is put back the soil is improved. Being burnt on the ground it serves as manure because it returns to the soil those substances that had been taken away.' But for every speculation that has been confirmed will be found many that have not, and the beginnings of agricultural chemistry must be sought later, when men had learnt the necessity for carrying out experiments.

This paragraph right at the beginning of the chapter indicates the defining themes of modern agricultural science. The first is that plant growth is to be understood in terms of a supply of chemical substances, and the second, implied by the first, that our approach to this understanding is analytical. These themes are evident in the statement '...returns to the soil those substances that had been taken away', and the reference to 'agricultural chemistry'. The phenomenon of plant nutrition is to be described and explained in terms of the chemical constituents of the materials added to the field as manures.

This paragraph is followed by a review of the experiments and speculations of the 17th and 18th centuries. Francis Home set out to 'try how far chymistry will go in settling the principles of agriculture.' He found that saltpetre (sodium nitrate), epsom salts (magnesium sulphate) and vitriolated tartar (potassium sulphate) when added to the soil all led to increased plant growth. His book was '...a great advance on anything that had gone before it, not only because it recognises that plant nutrition depends upon several factors, but because it indicates so clearly the two methods to be followed in studying the problem – pot cultures [that is, experiments] and plant analysis.' In 1795 the Earl of Dundonald added alkaline phosphates to this list. In 1804 Theodore de Saussure introduced the 'quantitative experimental method which more than anything else has made modern agricultural chemistry possible.' Still later the importance of air and more specifically carbon dioxide in plant nutrition was recognised.

As an eager agricultural scientist in training, I had no difficulty at all in falling in line with this general approach to agriculture; I had, after all, spent years in school learning chemistry, physics, biology and mathematics.

Several other themes are introduced in these quotes. The first of these, and the most general, is that modern agricultural science is the standard against which all pre-Enlightenment knowledge and practices are to be evaluated and judged. 'It has been the business of [contemporary] agricultural experts to classify and explain' the facts recorded in the literature on agriculture in Roman times. The various 'speculations' from later times (up to the 19th century or so) were also to be confirmed or otherwise in terms of their agreement or disagreement with modern agricultural chemistry. The statement that contemporary scientists classify and explain facts from Roman times means that these facts, insofar as possible, are to be placed in modern classificatory systems and explained in terms of contemporary contexts. It is probably true of scientists in every cultural era that they consider their own brand of science superior to anything that went before, and our era is no different.

In order to highlight the essential difference between the ancient European (and traditional non-European) approach and the modern one, let us return to the initial quote in which it is said that 'You will admit that when you bring dung into the field it is to return to the soil something that has been taken away.' All agricultural scientists from all cultures and ages would agree to this. The point to be made here is: how does one understand this fact. One way is to focus one's attention on the sheer fact of circularity and the other is to focus on what is circulated. The former is the traditional view in which complete circularity is recognised as an essential feature of natural processes. It is the farmer's first responsibility, from this point of view, to maintain the circular flow of biomass from and to the field that characterises this process if his or her crops are to flourish. 'Focusing on circularity' means that the phenomenon of plant nutrition is to be described in terms of the larger contexts in which the plant grows, that is, the field, and beyond that the farm as a whole, and understood in terms of its role in these larger systems. This is also the defining feature of natural or ecological farming which has appeared in the last few decades in response to the destructiveness of modern chemical agriculture. The latter focus of attention is on the chemical substances present in the biomass. These two ways of looking at agriculture have as their rationales entirely different systems

of primary concepts, the alternative system of this book and the system presupposed in contemporary global culture, respectively.

The reference to 'pot culture and plant analysis' referred to in Francis Home's book point to two more important themes. One was that plant analysis and the analysis of manures and fertilisers is to be the fundamental approach to research in plant growth. And as the 19th-century 'agricultural chemists' demonstrated, it is necessary not just to identify the chemical elements present, but also to measure their amounts by weighing.

The other theme mentioned by Home and dwelt upon at length by Russell is that of the necessity of experimentation or planned observation. Initially this was done in the laboratory by growing plants in pots but as it was necessary to obtain results that would be useful to farmers, field experiments were later taken up.

> In purely laboratory investigations it is customary to adopt the Baconian method, in which factors are studied one at a time, all others being kept constant except the particular one under investigation. [With field experiments,] however, it is impossible to proceed in this way: climatic factors will not be kept constant, and however careful the effort to ensure equality of conditions there is always the probability, and sometimes the certainty, that the variable factor under investigation is interacting with climatic factors and exerting indirect effects which modify or even obscure the direct effects it is desired to study.... The introduction of modern statistical methods has given to field experiments a new value they completely lacked before. In the past, field experiments were always weakened by the unknown errors due to the circumstances that the soil of one plot was never strictly comparable with the soil in another. [Thus] statisticians have had to devise methods for dealing with cases where several factors are varying simultaneously.

The basic concept in terms of which this approach to experimentation (testing of predictions) is formulated is clearly that of single-factor (or at most a mere handful), that is, specific causation. Throughout this introductory chapter and the chapters that follow Russell illustrates this general method

of field experimentation (both before and after the introduction of statistical methods) in some detail, and I was left in no doubt about just how to proceed in conducting research.

When I re-read Russell's textbook today, fifty odd years on, it makes no sense to me at all – because over the years my outlook has changed. I was one of the first in India to recognise the serious fallout from 'green revolution' chemical agriculture. I pondered this deeply and ultimately came to reject this form of agriculture altogether. That is, I rejected all the primary concepts on which it rests – and on which all modern science rests. I have spent the last three decades trying to formulate for myself an alternative system of primary concepts and an alternative protocol for research. This book is the outcome.

Elsewhere, I have described an approach to agricultural research based on this alternative system (Jackson, 2013 b).

4.2 The new protocol

The general guidelines that make up the new protocol are set out in this section. These are nine in number; the first seven are intended to guide the scientist in his or her research work. In as much as scientists are also innovators designing technological interventions in natural and human systems, two further guidelines (numbers 8 and 9) have also been included.

1. The objective of scientific research is to describe things.

Things do not exist in isolation. They are parts of contexts, and are themselves contexts for their parts. Contexts form a hierarchy of increasing size and complexity. The objective of scientific research is to describe things, or in other words, contexts. There are two ways in which this can be done. The first is to enumerate their parts and then describe the relationships among these parts. The second is to describe their place and function in the context which immediately subsumes them in the hierarchies in which they are found. These are termed descriptions of the first and the second type, respectively. Both ways are necessary in describing things.

2. Valid and appropriate methods of description must be used.

The starting point for gaining an understanding of things is to analyse it into its constituent parts and then describe the relationships among those parts (see guideline no.1). The mode of describing a thing in this way (description of the first type) must be appropriate to the type of thing it is. In the case of physical things, their organisational pattern must be described topologically. With thought things the pattern must be described in terms of abstract logical relationships as far as possible, but can also be described by using physical things symbolically. In describing emotional things recourse must, for the most part, be had to a symbolic mode – the stories of myth and dream and metaphor, and sometimes to such vague expressions as 'I am sad', I feel good'. And finally, in the case of feeling things, our descriptions will be limited entirely to such statements as 'I am hungry', 'I see', 'I hear', and 'my left elbow joint pains'; this thing is hot, wet, it has a particular smell and taste.

Descriptions of both types are done in the form of diagrams, maps or models as far as possible. These can reveal the primordial themes informing the things being described.

3. Descriptions of the second type are explanations

A description of the second type (see guideline 1) depicts the relationship of the thing to the other parts of the thing of which it is a part. This must be preceded by the description of the first type of the larger thing of which it is a part. A description of the second type is an explanation of why a thing is the way it is and behaves in the way it does. A thing is what it is and does what it does because of where it is. And it is where it is because it must conform to the requirements of the current configuration of the common, unitary causal agency.

4. Testing of new contexts must invariably be done in 'real life' situations.

Where new contexts are created in the course of scientific research, or existing contexts used to explain new facts, their usefulness must be determined by testing them (or our deductions from them) in the widest possible setting, or what has been termed here 'real life' situations, since

ultimately they will be applied in such settings. The so-called testing that is done in more restricted situations (in the laboratory or experiment station, say) is not really testing, but a phase of the concept development process.

5. Insight is essential to scientific creativity.

Insights are an essential input in scientific research. They are the starting point for the creation of new contexts, whether those contexts are primary concepts or contexts constructed to describe and explain facts appearing in waking experiences, and whether they are absolutely new in the history of human thought, or an existent context used in a novel way or in a situation in which it has never been used before. Learning the 'language' of insight – myth, symbol, metaphor – is an indispensible skill to be acquired by all scientists. Further, an ability to translate from this language to discursive language - geometrical, mathematical and verbal – is essential, insofar as it is possible. Where it is not possible, the scientist must be prepared to describe things in terms of myth, symbol and metaphor.

6. All things are living beings.

All things are living dynamic systems of relationships among other things (parts of things). As such they can only be meaningfully described as they are. Interfering with them in any way in order to describe them distorts, and may even destroy, them. From a study of mutilated or non-functioning systems all that can be achieved is an enumeration of their parts, which information is valueless in attempting to understand them. The dynamic relationships among the parts must be observed and described, which is only possible by studying them as they are – intact.

7. The scientist is part of what he or she describes.

The scientist is the subject of the experience of the contexts he or she deploys in attempting to describe things. Those contexts are his or her contexts in that they are the general contexts of the cultural ambience in which he or she willingly participates. Even more obviously, new contexts which the scientist himself or herself creates are his or hers. He or she can experience phenomena only in terms of his or her contexts, and in no other way. He or she cannot be a 'detached observer' of things.

8. Interventions in systems must be gentle.

Interventions in systems must be gentle. That is, they must not impair the health of the systems in which they are placed. Thus, they should not abstract a part of the system, or forcibly introduce a foreign element into the system. Such violent interventions can only, in the long run, impair the health of systems, giving rise to violent reactions or killing the systems altogether.

Similarly, when natural systems, that is, those systems having suffered little or no violent human interventions, are modified to accommodate human beings, such as converting a forest to an agricultural or urban ecosystem, they must not be distorted in terms of their essential structure.

9. Sick systems must be healed before further interventions are contemplated.

Virtually all natural systems and all-human created systems on our planet Earth are today sick. The highest priority in scientific research will therefore have to be given to the questions of why they are sick, how they sickened and how they can be healed. The functioning of a healthy system will in such circumstances have to be inferred or intuited from studying sick systems. Systems have to be made healthy again – or, more accurately, helped to heal themselves – and then ways found to keep them that way.

4.3 Getting from here to there

The difficulty for the individual scientist and for the community of specialists to which he or she belongs – not to mention everyone else – in abandoning an existing protocol and taking on a new one has already been described in general terms. The method I wish to suggest for overcoming this difficulty in any particular field of scientific enquiry consists of taking a few steps backwards in the chain of the development of the system of complex contexts that make up the present body of knowledge in that field to those earlier, simpler contexts which we have no difficulty in accepting, given our new protocol and the set of primary concepts on which it is based. From there we move forward again building higher-order contexts through research guided by the new protocol. Put more simply, we attempt to

salvage as much current knowledge as possible and build it into our new knowledge system. I will illustrate this method with reference to the developments in four different subject-matter areas, astronomy, evolution, chemistry and psychotherapy, going back in each case to the work of one key person who initiated the line of development that has culminated in the present body of knowledge in that area.

4.3.1 Nicholas Copernicus

From antiquity all astronomers up to the time of Copernicus agreed that the purpose of astronomy was to construct a model that could accurately depict the relative movements of the sources of the lights that were variously termed sun, moon, fixed stars and 'wandering stars' or planets. They all insisted that their models were constructed solely to 'save the appearances'. They did not claim that they were pictures of the way the things 'really' are. Copernicus broke with this tradition.(1) In our present exercise of 'taking a few steps backwards' this is where we stop; it is the point from which we will move forward again on a new trajectory, accepting as many as possible of the contexts of Copernicus and those who followed him, and rejecting all the others.

'Saving the appearances' is equivalent to saying that the job of the astronomer is to describe as best he or she can the appearances of things. With this we are, in view of our new protocol, bound to agree. For 'the world' of which the ancients and Copernicus spoke is itself a context constructed from the appearances of things – a high-order context to be sure, but still a context. There is no such thing as a world 'as it really is', or as has been said earlier there is no world 'out there'.

In the ancient and medieval periods in Europe, and in most non-European cultures, sun, the planets, the moon and the fixed stars where thought of as living beings. In this Copernicus appeared to agree. Here too we are in agreement.

Finally, ancient astronomers and Copernicus, and Johannes Kepler as well, constructed geometrical models to describe the solar system. With this we also agree. This is a topic we will return to later.

Copernicus re-introduced the sun-centred model of the solar system into European scientific discourse in the 16th century.(2) More accurately, his contribution amounted to the bare suggestion that the sun be put at the centre of the solar system model rather than the earth as was done in the Ptolemaic model which was current at the time. He also insisted that the earth rotates. The alternative model he constructed, using essentially the same data that Ptolemy had used, was, however, no better than Ptolemy's. By placing the sun at the centre, he was able to dispense with the complicated system of epicycles used by Ptolemy to account for the apparent retrograde motions of the planets. But Copernicus never managed to locate the centre of the solar system exactly in the sun, but only near it. In fact, in his system the centre of the solar system was the centre of the earth's orbit. This created a new set of problems to solve which Copernicus was obliged to created a new set of epicycles; these were more in number than those is Ptolemy's system (Koestler, 1959, p. 195).

Johannes Kepler at the beginning of the 17th century succeeded in creating a truly sun-centred model using the vastly more accurate observational data of Tycho de Brahe. In the course of his labours he was forced to abandon the concepts that the orbits of planets are perfect circles and that planets move at constant velocities in their orbits, ideas dogmatically held by all astronomers up to his time; he found that his predictions agreed with de Brahe's data when he assumed elliptical orbits. Compared to all previous models, his was simpler, more elegant and more accurate.

This is the extent to which we can travel along the historical route of the science of astronomy. From this point onwards our path must diverge if we are to adhere to the new protocol. For a new idea enters into and changes the direction of Kepler's thought. That idea is that the planets and the moon move as a result of a force being applied to them. This, of course, implies the prior concept that they are not living beings with intelligence and the power of self-locomotion, but rather 'dead' lumps of matter.

Kepler did not succeed in developing a plausible definition of force; that was done by Newton, though actually Newton's definition was as vague and implausible as Kepler's (See Section 2.1). What made Newton's idea

of force so attractive was the simplicity and elegance of the mathematical way he expressed the relative motions of pairs of bodies. His force is the name given to a concept of the nature of causation, a version of the more general concept of law as imposed. This was not made explicit in these terms by Newton or by anyone else since his time.[3] With this concept we are unable to agree. The alternative, antithetical concept to which we are committed is that of causation as immanent.

A related issue here is that before the advent of the sun-centred model was developed, it was customary to regard only the 'heavenly' bodies as living, and indeed, divine beings. The earth was excluded from this category, being manifestly 'earthly'. This distinction was not tenable after the sun-centred model was accepted. Seemingly, this led to the notion that all heavenly bodies, including the earth are 'earthly', that is, not divine.

All this is more than enough to justify the parting of the ways at this point. But to complete our critique of Newton's and also of Galileo's work, two further considerations may be mentioned. The first is that the notion of mass is mistaken, even in terms of the materialist scientific system of primary concepts. Objects have no mass or any other attributes; their apparent attributes are really expressions of the relationships between them and all the other parts of the system of which they are parts (Section 3.1.1). Without the concept of mass as an attribute of an individual object considered in abstraction from the system in which it participates, Newton's law of universal gravitation, are meaningless.

The other consideration in our critique of Newton's work is that the mathematical method of description he used is inadequate for a complete understanding of the motion of any particular body. Such understanding can come only from a description of the solar system as a whole. And the mathematical model is incapable of describing the system as a whole. Only a geometrical model can do this.

It should be clear from the foregoing arguments why in our future research on the solar system and beyond guided by the new protocol, we must abjure the work of Galileo and Newton, and also that of Kepler after his formulation of his laws of planetary motion, and proceed to break new ground. The way to go is to describe systems of physical things as fully

and in as much detail as possible in terms of marker things and events (parts of the things) using the graphic, topological methods pioneered by Leonardo da Vinci (see Capra, 2008, Chap. 7).

As a footnote to this section, it is necessary to add that this altered course of research in the extra-terrestrial domain means that research and innovation in the terrestrial domain will likewise need to be altered, inasmuch as it is also guided by the Newtonian mechanical model. Thus, In designing alternative technological innovations to those based on Newtonian mechanics, our first concern must be to ensure that they are congruent with the local ecosystems in which they are to be deployed. The term 'congruent' means that the innovation must not stress or distort the basic organisational pattern of the system. It must not undermine its health (protocol item no. 8). This will probably require the search for, and development of, entirely new contexts that can be used in designing innovations - in place of the Newtonian mechanical contexts presently used. Such alternative contexts will necessarily encompass not only physical things and thought, emotional and feeling things as well, since human beings and their social systems are integral parts of all terrestrial ecosystems.

4.3.2 Jean-Baptiste Lamarck

The common world context of medieval Europe was of an essentially static entity. The earth and the various types of its inhabitants were created at some definite time in the past, and their forms had not changed since. This context was shared alike by scientists and non-scientists. Among scientists this began to change from the early 19th century. Evidence came to light that species of plants and animals change over generations in terms of their physical forms and in terms of their habitual behaviour patterns. This change was also seen as a series of incremental steps from less to more complex forms. Jean-Baptiste Lamarck in the first decade of the century accepted this evidence, described these changes, and termed the process of change evolution of species. In the sixth decade Charles Darwin, in his classic Origin of Species, described this evolutionary process in more detail and for a wider range of species. Both offered explanations for such change, but these differed.

The difference in their explanations is important. Tim Lewens (2007) has written that Lamarck suggested that:

> as changing environments impose new requirements on species, the organisms in question are forced to acquire new habits in response to these altered demands....[they] have a kind of inner drive to adapt to their condition....if a faculty was used during the life of the individual, then the alterations brought about by increased use would be inherited in future generations....So...adaptable habits, coupled with this mechanism of inheritance (called 'use inheritance' in Britain) could lead to the limitless transformation of species in such a way that they would track the demands of their environments as those environments changed over time (pp. 13-14).

In contrast to this, Darwin explained adaptation as occurring as a result of three distinct processes. The first is that variations in physical form or behaviour between parents and offspring occur by chance. The second is the selection of these variant offspring that are best adapted to current environmental conditions. And third, is the passing on of the variations of the selected variant individuals by means of inheritance.

Neither Lamarck nor Darwin offered an explanation for inheritance.[4] Lamarck did not elaborate on his notion of 'a kind of inner drive to adapt to conditions', and Darwin could not elaborate on his notion that 'variations arise by chance'.

My purpose in this section, as it was in the previous one, is to consider to what point in the historical development of the scientific contexts relating to change in plant and animal physical structure and patterns of behaviour over generations it will be necessary for us to return. That will be our starting point for the study of change following the alternative protocol outlined in Section 4.2. This starting point will be our acceptance of the concept that evolutionary change does occur, and a rejection of all explanations in the field of Darwinian evolutionary theory of how such change occurs because these explanations were developed in accordance with the protocol of mechanistic science.

The general approach to the study of change begins with seeing that plants, animals and micro-organisms are parts of the systems in which they are embedded, and the changes they undergo from generation to generation as a concomitant to the changes in those systems. A change in a system means a change in the configuration of its parts, and a reconfiguration of parts redefines each of the parts. Only a study of systems can lead to an adequate understanding of evolutionary changes in things over time.

Having established the broad general approach to the study of change in organisms that is now required, I would like to suggest a framework in which this study may be conducted. In doing this I will utilise several existent terms – species, ecosystem and ecosystem niche. They will be used to designate not the fully developed concepts that are deployed today, but the bare notions that have given rise to those concepts. The term 'species' will refer to the general notion that organisms can be collected into groups of similar individuals on the basis of their physical and behavioural forms. The term 'ecosystem' will refer to the notion that Gaia, Earth, as a self-defining, self-creating and self-regulating dynamic living system can be seen as consisting of parts which are systems in their own right, and in fact as making up a whole hierarchy of systems of decreasing size and complexity. The term 'niche' will refer to a specific place and function within an ecosystem that can become the 'home' of a particular organism; the term is an abstraction, for a niche cannot be described in the absence of the organism that occupies it. One niche is occupied by only one individual organism. There are as many niches in an ecosystem as there are organisms. This is a distinct departure from the present-day definition, which is that a niche is a place occupied by a group of similar organisms. The grouping of organisms according to species is at best an expedient, for no two organisms are exactly the same and no two niches either. Each organism in its niche is unique.

These three concepts are utilised to create the broader concept (context) that changes in Gaia, from the most general (movements of tectonic plates, earthquakes, volcanic eruptions) to the most trivial (a minor landslip on a mountain side) create new niches and modify or close down existent ones.

As a result organisms die out, move, or change in subsequent generations. Climate change resulting from variations in solar radiation received or the activities of organisms on the earth (the appearance of photosynthesising organisms, for example, or of human beings) have similar effects.

A clarification needs to be added about my use of the words and phrases 'create', 'close down', 'resulting' and 'as a result' in the previous paragraph. I have been constrained by the limitations of word language. Actually, given our concept of a common causal agency immanent in all, there are no specific causes, but only effects; all changes, on all scales, are manifestations of changes in the causal agency. As a concession to clear, logical thought we may locate specific 'causes' in some larger context than the one of our immediate interest. But we are never justified in looking for 'causes' in lesser contexts.

'Explanations' derived from lesser contexts, as for example that the forms and behaviour of organisms are determined by their genes are invariably misleading. If it were indeed the case that genes 'cause' bodily form and function, and that changes in form and function over generations are the result of changes in the composition and structure of the organisms' genes, then we must logically ask, what causes changes in genes. Since there is no answer to this question, a person who advocates this gene context falls back on the notion of 'chance'. From the standpoint of the new science of this book, the concept of chance is illegitimate; the concept of a common causal agency operating within every thing insists on absolute determinism. We are bound to say, therefore, that changes in gene composition and structure are but two of myriad aspects of the overall changes in the form and behaviour of the ecosystem and beyond that the entire earth system.[5]

In accordance with the new protocol our research into changes in forms and behaviour of organisms over generation must focus only on describing as carefully and in as much detail as possible, the forms and behaviour of existent organisms in terms of the niche each occupies in the next larger system in which it is found, that is, the ecosystem. Since it would be impossible to do this for individual organisms because, in most cases, they are too numerous, they can be grouped into types and niches they occupy consolidated.

Before beginning this research it is necessary to be clear what is meant by the term 'change': what changes: does anything in fact change? When we say that something changes we mean that that something changes over time in terms of its form. This implies that the 'something' in some sense persists. We can only know that it persists if we can describe it. But if has no form we cannot describe it. We can never be certain that the 'something' persisted amidst change; for all we know, the two things we experience, one before and one after the so-called change, are two different things. Thus we must conclude that there is no such thing as change, but only creation of new things and their disappearance – that is, supersession by another thing. What a present-day scientist sees as change is actually a series of two or more distinct, though in some ways similar things. This series is what has been termed in this book a temporal community. The only entity that can be said to change is the primordial theme that informs the successive changes that appear. It changes in the sense of being deformed.

A concrete example will make this clear. I see a small, brown-coloured furry animal. (This statement is obviously an advanced context consisting of many lower-order, simpler contexts. This is indicated by the use of the words 'small', 'brown-coloured', 'furry' and 'animal'.) As I continue to observe it over a period of time – actually a series of observations spread over several months or even years – I note that it 'changes' in many ways: it grows bigger, acquires adult proportions and patterns of behaviour, then begins to age, and finally dies. For all practical purposes we say 'the' animal undergoes changes in the course of its life. 'The' animal is, however, a temporal community (interrupted and then resumed again at intervals in this example); every moment the observed animal disappears and is followed by a similar animal. This similarity occurs because many, indeed most, of the gathered up seeds of past experiences of which the two are composed are the same. The two animals are also different because their shared past experiences are differently arranged – in accordance with the requirements of the different configurations of the causal agency. But in no case do the differences between successive animals amount to a difference in the primordial theme informing them. A given theme remains for the

duration of the life of the animal, undergoing only slight deformations from experience to experience.

We now have the means to refute the contexts of Lamarck and Darwin. They were concerned with what they saw as changes in form and behaviour from generation to generation. This attempt was misguided because things do not change. Each generation is a de novo creation. It is therefore necessary for us to back up until we come to the basic facts of the matter (there is a series of appearances of similar things) and then strike off in an entirely different direction.

Why is it, then, that offspring usually resemble their parents? The answer is simply that some of the same elements (past experiences) that entered into the creation of the parent organisms also enter into the creation of the offspring. Further, they share the same primordial theme. And why is it that offspring also differ from their parents? This is because parents and offspring are different and discontinuous temporal communities. The appearance of an offspring for the first time marks the initiation of a new and novel temporal community.

Finally there is the matter of 'species' to consider. As suggested earlier, this concept of a group of similar individuals is necessary in practice, as is the analogous concept of a group of similar niches. What is the basis for making such groups? Darwin said that if two normal individuals of opposite sex would not mate, or could not mate successfully, they belonged to different species. Is there any basis for this? In contemporary scientific thought there are no clear answers to this question (see Chapter 3 in Lewens, 2007). In the new science being described in this book, there is a very definite, logical criterion for deciding whether two individuals belong to the same species or not. It is that they either do, or do not share the same primordial theme. In a group of individuals that are mostly similar and vary only in minor ways, we can expect to discover that they all share the same primordial theme, only it is deformed in various different ways in different individuals of the group. If a given species or niche is stressed unduly, new individuals may appear which participate in a different primordial theme than their parents; they cease to be a part of the initial group or

species. This, of course, would happen only when the existing theme had been deformed to the point where it collapses, and the creation of further individuals of that pattern is no longer possible. There is ample evidence in the fossil record of the (relatively) sudden appearance of forms of organisms that radically differ from those that preceded them and which are seen as their 'ancestors'.

If we aim at more penetrating and detailed descriptions of things it is likely, it seems to me, that primordial themes will come into view. Our approach will be to pick out 'marker' features, describe their relationships, and compare the different patterns they form. This would greatly facilitate work on taxonomy and the development of alternative approaches to breeding of domesticated plants and animals and medical research.

4.3.3 Antoine Lavoisier

The concept of the atom, a very small physical entity that was thought to be the ultimate constituent of all material objects was widely accepted in the 17th century. However, almost no thought was given by scientists to the nature and behaviour of these atoms. With the exception of Robert Boyle there were no chemists.

In the 18th century Antoine Lavoisier contributed a clear definition of an element, so important in the further study of chemical phenomena in the 19th century.

> ...if, by the term *elements*, we mean to express those simple and indivisible atoms of which matter is composed, it is extremely probable we know nothing at all about them; but if we apply the term elements...to express our idea of the last point which analysis is capable of reaching, we must admit, as elements, all the substances into which we are capable, by any means, to reduce bodies by decomposition (from Knight, 1967, p. 11)

Significantly this definition did not assert that atoms are indivisible in principle, thus departing from the 17th-century concept inherited from the Greek atomists that atoms are by definition indivisible.

It is to this point in the development of chemical science, that is, Lavoisier's definition of an element, that we must return in order to begin building again, rejecting everything that came after that. In accordance with the general requirements of the new protocol presented in section 4.2, our new chemistry will be largely descriptive.

But to be more specific, I suggest a set of basic principles to guide research when a new beginning is made. These follow from Lavoisier's lead (definition of the term element) and elaborate, with special reference to chemistry, on the various guidelines in the new protocol.

1. All physical things have parts and are themselves parts of larger things.

To phrase the matter somewhat differently, all things are parts of some larger thing. They are therefore termed 'particles'. A given particle is termed an element when it is known, by analysing it, that all its immediately-contained particles are the same. Where the immediately-contained particles differ among themselves, that particle is termed a 'compound'. The term 'immediately contained particles' in these definitions refers to the particles occupying the next lower level in the hierarchy of inclusivity to the particles in question.

The analogous term to an element in contemporary chemistry is 'atom', and the analogous term for a compound is a 'molecule. The sub-atomic particles of modern chemistry (and physics) are, in the new system, termed 'sub-elemental particles'. These alternative definitions are necessary. Continuing to use existing terminology is a hindrance when learning to think about designing and conducting research according to a new protocol

Chemists mainly study elements and compounds, whereas the study of sub-elemental particles falls in the domain of physics. There are, however, no natural boundaries between levels of inclusivity of particles but only one unbroken hierarchy from sub-elemental to galactic particles.

2. In principle there is no smallest particle. In practice the smallest particle we can discern is determined by the acuteness of our observational techniques.

There does not seem to be any reason, and probably also no need, to assume that there is an 'ultimate' particle, that is, a particle with no parts. The passion of physicists over the past century or so to discover the ultimate particle is driven by the need for finality and elegance of mathematical description. But, as has been consistently argued in this book, mathematical descriptions of physical phenomena are not valid in the context of the new protocol. Such a final description, assuming it were achieved, would be of the same species as Newton's mechanical descriptions, and would, therefore, create still more violence than we have already wrought.

It must be kept in mind that analysis of particles (in order to create descriptions of the first kind – see protocol item1) is only a necessary preliminary to developing descriptions of the second kind that alone count as explanations. Hopefully with this understanding physicists and chemists will have a more relaxed and circumspect attitude to the task of analysing particles.

3. A particle is delimited by an interval of empty space around it. We know that a particle has parts, when we do know it, because of the empty spaces between those parts.

Particles and space are dependent on one another for their definitions. Empty space is where there is no particle, and a particle is filled space.

The concept of empty space is, of course, necessary to the understanding of physical phenomena. If there was no empty space within a particle between its parts, then those parts could not move. Indeed, we would not even know that the particle has parts.

The concept of empty space has been a problem for physicists and chemists since the 17th century. It became a problem with the introduction of the concept of gravitational force. This force was supposed to act at a distance across empty space instantaneously. Neither Newton, who formulated the concept, nor anyone else, could accept this concept, but they found it so useful that they could not give it up. Instead, they said that space that is not occupied by physical objects is not really empty: it pervaded by ether. This ether was conceived as a subtle, physical something

that could transmit force. This is no more believable than the original concept of force acting across empty space. After numerous unsuccessful attempts to demonstrate its existence, the concept was abandoned. Action at distance remained a problem, and it became even more acute with the introduction of the concepts of additional types of forces – magnetic, electro-magnetic, strong and weak nuclear forces. The solution took the form of 'fields', a concept as incomprehensible, except perhaps in mathematical terms, as that of the ether. In short, the concept of fields explains nothing. Commenting on the concept of gravitational force, Arthur Koestler has written: '...Newton's concept of a 'gravitational force' has always lain as an undigested lump in the stomach of science; and Einstein's surgical operation, though easing the symptoms, has brought no real remedy (Koestler, 1959, p. 344).'

In the science of the new protocol, empty space is not a problem because it is unnecessary to explain motion and interactions among moving particles in terms of forces. The alternative explanation is that particles are living beings, active, perceptive and intelligent.

4. Particles are living systems. A system is a group of processes that interact with one another in repetitive ways.

A process is the logical continuation of a particle in a temporal community. The impetus for the motions of the particles that participate in these processes, and the perceptivity and intelligence that enables them to participate effectively in systems are explained by the concept of particles as living beings.

Elements, sub-elemental particles, and supra-elemental particles (compounds) are all living systems. Just as the living Earth participates in our local solar system as it does, so does a particle of oxygen in a sugar compound system knows its role, knows how it must act to fill that role, and has the ability to manoeuvre accordingly. This is an approximate, preliminary statement: it will be developed further under the following heading.

5. The properties of a system are determined by its place and function in the larger system in which it participates.

It is thus impossible to describe a system in isolation, for it is always a part of a larger system, whether naturally-occurring or human-made.

This statement is of the utmost importance for an understanding of what happens in chemical reactions. What it means is that the 'carbon' in a carbon dioxide system and the 'carbon' in carbonic acid system have different properties since they are participating in different systems and their properties of each are entirely determined by their respective systems. Further, the elemental 'carbon' in a pinch of carbon black is not the same as the 'carbon' in these two compounds because the system (or context) in which it is participating (a glass bottle sitting on a shelf in a laboratory) is different from those of carbonic acid or carbon dioxide. The logical consequence of this statement is that there is no such thing as carbon per se. There is no 'carbon' in either of these compounds.

Further, when we say 'this black powder is elemental carbon', we are being arbitrary. We are choosing one particular system over another from among the many systems in which 'carbon' participates in order to define elemental carbon. The system usually chosen is the chemical laboratory of a certain era with people of a particular mindset observing the 'carbon' and interpreting their perceptions in order to formulate a description. All that can reasonably be said is that when 'elemental' particles of sulphur and of oxygen disappear in a chemical reaction under specified conditions, sulphur dioxide will appear. But there is no 'sulphur' or 'oxygen' in it. Therefore its name is a misnomer. A different name is required if we are to avoid the false impression that particles of 'sulphur' and particles of 'oxygen' are incorporated into a compound. Names like 'water'. 'table salt' and 'caustic soda' which do not imply the incorporation model of a chemical reaction are needed. This was the practice among chemists until the concept of the conservation of matter was formulated and accepted by chemists in the late 18th century.

What then is the model that accords with the new protocol? When a particle of an element, say, disappears in a chemical reaction, it can be said to have died. And when an element or compound appears, it can be said that they are born. One temporal community, or set of temporal communities, disappears and a different temporal community or set of temporal communities appears. There is regularity in terms of what disappears and what appears, such that, for example, when hydrogen and oxygen

particles disappear under specified conditions, water will always appear. And the same ratios of the amounts of the particles that disappear and those that appear are always observed. These are the basic observations on which the whole of experimental chemistry with the new protocol is constructed. As for explanations, the most we can do is say that they behave as they do in obedience to their 'ways'. With accurate descriptions of the second kind, the primordial themes that inform their patterns of behaviour may come into view.

Following these guidelines which derive from the the guideline of the new protocol will enable chemists to create a gentle chemistry. The emphasis will be on understanding naturally-occurring compounds and the natural systems in which they function. Better understanding will make it less likely that we will make ourselves and the natural systems in which we are embedded sick - as we are doing today with our heedless synthesis and dispersal of exotic compounds.

4.3.4 Sigmund Freud

In terms of the new protocol introduced in this book all scientific research is an attempt to describe the forms of things. Since all things are organisms, the term 'organisms' can be used in place of 'things' in this statement. In terms of descriptions of the second type (see protocol guideline 1), an organism may be described in terms of its place in the larger organism of which it is a part, and in terms of its behaviour within that larger organism. The term 'place' means its geometrical, logical or emotional relationships to the other parts of the organism. The term 'behaviour' means its movements within the system in relation to the other parts, again in geometrical, logical and emotional terms. In dealing with the solar system, we construct primarily geometrical descriptions (Section 4.3.1), whereas in constructing a system of primary concepts we frame our descriptions primarily in logical terms, and with plants and animals it is necessary to give equal attention to geometrical, logical and emotional terms. The notion of emotional descriptions is implicit in speaking about 'instinctual' and 'learned' behaviour (Section 4.3.2).

In the present section we shall be concerned with describing the behaviour of human beings in logical and emotional terms, and in particular the way of approaching this task pioneered by Sigmund Freud.

The objects of Freud's study were 'unusual', 'irrational' and 'abnormal' behavioural patterns. In order to classify, describe and explain these phenomena he departed in an important way from the purely mechanistic notion that all such behaviour is the result of specific abnormalities in the person's physical body. In other equally important ways he conformed to the prevailing scientific outlook. He used the Cartesian concept of mind in framing his descriptions and explanations (see Box 4.1 *The mind*), and in fact expanded the concept by analysing it into parts. In terms of our new science – that is, the alternative system of primary concepts and the alternative protocol which derives from it – we can go along with Freud where he departed from existing 19th century science, but must draw a

Box 4.1 The mind

The concept of mind is perhaps the most confused and confusing concept ever created. It is an aspect of the broader concept of how the subject of an experience comes to know the content of that experience. It has a long history, and I will not attempt a review, but will restrict my observations to the form in which it appears in Western and particularly in the Enlightenment system of primary concepts. The problem for the solution of which it is evoked is that of explaining how nerve impulses terminating in the brain are transformed into images and sensations. In addition to transforming nerve impulses into images and sensations, the mind is said to be a factory for the manufacturing of thoughts and a memory bank. The mind is not a physical thing but a model of a process or processes, or in other words, a thought thing. The model, however, is not described and indeed cannot be described. It is a meaningless word, used to get over a logical discontinuity in the larger description of the process of knowing framed in purely mechanistic terms.

The problem with the concept of mind is that it is an attempt to salvage a defective system of general concepts. In abandoning that system in favour of the alternative being set forth here, the need for the concept of mind disappears. Freud's elaborate system of analysis of mind is irrelevant to the alternative method of scientific research into mental health.

line at agreeing with him where he conformed to it. From this point onwards we must break new ground, and by doing so will hopefully develop a simpler, more coherent and effective way of describing and understanding the appearances of discordant emotional, thought and feeling things in experience.

In developing this alternative approach, a beginning will be made from the concepts of 'private' and 'public' contexts introduced in Section 2.3.3. A public context is one that is widely shared among the group to which the individual belongs. It is recognisably a legacy of past generations of people of that group. Young people are exposed to these public contexts and gradually take them on board as they grow up. New public contexts are created when private contexts appearing for the first time in the experiences of particular individuals are found useful in practice and so are adopted by others. In this process these new public contexts are added the existing ones or in some cases replace them.

The constellation of public contexts that are current in a particular group in a particular era is the standard against which individual behaviour is judged. If a person uses contexts that are not included in the current constellation of public contexts, that person's behaviour becomes 'abnormal'. Such behaviour may be simply amusing or mildly embarrassing or annoying. Examples are parapraxes of various types.[6] Or they become problems for the individual himself or herself as well as for others. These come under the heading of neuroses.[7]

An understanding of the origin of private contexts that give rise to and perpetuate seriously 'abnormal' behaviour is necessary in order to overcome them. Analysis is the starting point for describing and explaining such behaviour. Attention must first of all be given to the entire constellation of contexts, both private and public, that existed at the time in the person's life when the troublesome private context was created. It must be analysed and then described. (This is a description of the first type – see protocol guideline 1.) The troublesome context must then be described in terms of its place and function in this constellation – a description of the second type). This latter description should reveal why the context was created.

In general, the reason will be that the person's immediate situation was such that he or she was stressed unduly, and the private context was created as a part of the movement towards relieving that stress.

Attention must then be shifted to describing the constellation of contexts that obtains at present. The procedure is the same: both types of description are needed. This may reveal why the problematic private context is being perpetuated even though the person's life situation is now different from that obtaining when the context was created.

In the foregoing discussion the object of research is the individual person and his or her problem. He or she must be helped to understand his or her current constellation of contexts, why it is disharmonised and how it became so. The role of the therapist is to help him or her acquire this understanding. At the same time, the therapist seeks to empower the patient so that he or she can formulate and pursue his or her agenda for healing. After all, the patient must finally take responsibility for his or her own cure, otherwise the therapist's effort is wasted. His or her agenda may include going back to the time when the troublesome private context appeared, reviewing the situation that then appeared and interacting again with the people who participated in it. At the same time he or she must experiment with changing the situation which is presently perpetuating that context, and this again will certainly involve interacting with other people. All this the patient must do himself or herself, with perhaps a little support from the therapist. The initial therapy sessions must be looked on as a training period. When trained the 'patient' becomes his or her own 'therapist'.

In considering the general topic of mental health one further issue remains. It is: what, in general, constitutes the standard of normal behaviour? Or, to put the question more crudely, what is the standard of sanity in terms of which we label some people mad? Is the current shared constellation of public contexts sane? After all, some public contexts become outdated and ripe for replacement; if they are not replaced they may create personal discomfort in the majority of people, because they do not have the courage to question them. I am thinking here of the outdated primary concepts of

our own contemporary global culture leading in practice to the multiple crises that are engulfing us. Right from the time of Freud, psychologists and psychotherapists have asked this question: what is the standard of sanity?

> Freud, after witnessing the insanity of the First World War, proposed that society itself might be mad and therefore could not serve as a standard of mental health.... [R. D.] Laing argued that we live in the midst of 'socially shared hallucinations...our collusive madness is what we call sanity.' [Theodore] Roszak comments that 'sick souls may indeed be the fruit of sick families and sick societies; but what, may indeed be the measure of sickness for society as a whole? While many criteria might be nominated, there is surely one that ranks above all others: the species that destroys it own habitat in pursuit of false values, in wilful ignorance of what it does is "mad"'.
>
> (Hibbard, 2003)

In this connection I will recur to the child who experienced an inner revulsion to chemical fertilisers and automobile exhausts (Section 2.4.3). These were private contexts at odds with the public contexts of his time. He did not share these with adults for fear that he would be considered 'odd' and ridiculed. As he grew up he overrode these contexts but did not outgrow them. Later as a professional scientist they came to the fore again, and he then found the courage to voice them. He did not escape being thought 'odd', but he did not give them up and has now in his old age lived to see them vindicated.

Notes

1. Copernicus broke with this tradition in that he thought that he was describing the solar system as it 'really is', and said so in his book On the Revolutions of the *Heavenly Spheres*. But fearing opposition to this departure from tradition, Andreas Osiander, who was in charge of the printing of the book inserted an anonymous preface, apparently without Copernicus' knowledge. In this preface he wrote '...that the ideas need not be taken too seriously; "for these hypotheses need not be true or even probable; it is sufficient that they should save the appearances (Koestler, 1959, p. 170)."' This was accepted as Copernicus' definitive view, for virtually no one actually read his book. As Koestler has said, it was a 'book that nobody read', an 'all-time worst seller' (Ibid, p. 194).'

2. In the third century BC Aristarchus of Samos created a heliocentric model of the solar system which in outline was the same as that we use today. It was widely known in Hellenistic times, up to about 400 AD, according to the evidence presented by Koestler in his book *The Sleepwalkers* (1959, pp. 74-5). Aristarchus was a well-known and respected astronomer in the Pythagorean tradition, and presented his sun-centred model in a book. But after 400 AD or thereabouts it was forgotten, and the monstrously-complicated Ptolemaic model took over the field. It was some thousand years later that the idea of a sun-centred model reappeared in the work of Copernicus, and was followed up by Kepler who created a workable version of the model that successfully predicted the future positions of the planet Mars as viewed from Earth.

3. Newton's concept of force, as embodied in his laws of motion, it will be recalled, requires the companion concept of perpetual motion. This concept might be considered a version of the notion of life – that is, being an expression of life – but this is hardly compatible with the concept that the planets, moon and sun are lifeless aggregates of matter. Otherwise it must be considered entirely arbitrary, made with no reference to the overall system of concepts deployed.

4. Actually, Darwin did propose an explanation of inheritance in his *The Variations of Animals and Plants Under Domestication*, written nine years after the *Origin of Species*. He termed it 'pangenesis. This explanation is based on the concept of units of inheritance contained in the sex cells that are passed from parent to offspring, that was later developed into the theory of genetic inheritance that is current today. For a brief account of the pangenesis idea, see Lewens, 2007, pp. 107 and 268.

5. This general way of looking at evolutionary change, it will be seen, could well be the basis of an elaboration of Lamarck's concept of 'an inner drive to adapt' which Lamarck himself was unable to provide

6. In his *Introductory Lectures on Psychoanalysis* Freud begins with the phenomena he terms parapraxes. He describes these as '...phenomena which are very common and very familiar but which have been little examined, and which, since they may be observed in any healthy person, have nothing to do with illnesses (Freud, 1973, pp. 50-1).' These include 'slips of the tongue', misreading' or mishearing', 'forgetting' (that is, temporary forgetting), 'mislaying' (of things), and 'errors' (that is, when we believe for a time that something is the case which we know both before and afterwards is not so. 'They are almost all... unimportant..., most of them are very transitory, and they are without much significance in human life. Only rarely does one of them, such as losing an object, attain some degree of practical importance (Ibid., p. 51).'

7. Neuroses are mental illnesses not caused by organic disease. These include neurasthenia (including hypochondria), hysteria (the symptoms of which include selective amnesia, volatile emotions, attention-seeking behaviour), obsessive-compulsive behaviour, schizophrenia, and maniac-depressive psychosis.

Glossary *

Actual existents

What actually exists (see *Existence*) is only *That Which Is,* or pure *awareness.* It alone is *real.* The *I* and the experiences that appear in *awareness* are thus not real, they do not actually exist. Nevertheless, we will say that they are dependently real since they stand forth against the backdrop of the real, and, indeed, emerge from the real. They can be said to exist when seen against the backdrop of That Which Is, otherwise not. Given this proviso we can say that experiences are actual units of existence. They are actual manifest existents when they are experienced in the now of current episodes of experiencing, and actual unmanifest existents when they exist in the past as *karmic seeds.*

Awareness

Awareness is the indescribable, content-less, unchanging backdrop against which experiences (see *Experiences*) appear and continue to exist (see also *Existence, That Which Is*). Pure content-less awareness is 'known' when all experiencing ceases.

Causal agency

This is a shorthand expression for 'unitary, common, causal agency'. The agency is immanent in every actual unit of *existence*, that is, in every *actual existent.* It acts simultaneously from within every actual

* Words in italics refer to headings in the glossary itself.

existent at every stage of its career. It is both a dynamic organising, self-perpetuating system of abstract logical relationships, or *primordial themes,* and an archives of all *karmic seeds.* The *form* of every *experience* is the outcome of the possibilities and limitations of the causal agency as it is configured at the time an experience is created.

Causation

In general terms a cause is what gives rise to the appearance of a *thing* or an *event.* In this book no prior specific thing or event is considered to be the cause of another. Rather, the cause of the appearance of a particular thing or event is the totality of all prior things and events. The agency by which this casual sequence is effectuated is termed the *causal agency.* It is a specific formulation of the general notion of law as immanent in, rather than imposed on, *actual existents.*

Coherent

A *system* of *primary concepts* is coherent when the individual concepts which compose it are mutually dependent on one another for their meaning. This does not mean that they are definable in terms of each other, but that none is fully intelligible in the absence of all the rest. Further, all must be demonstrably derived from one and the same mega-concept. This mega-concept is not, however, dependent for its meaning on any of the individual concepts of the system.

Collective mindset

A collective mindset is a habitual way of thinking shared by all people of a given culture and cultural era. This way of thinking is determined by a distinctive *system of primary concepts* or *contexts* that explain their *experience.*

Community

A complex, newly-created *experience* emerging from the second phase of an *episode of experiencing* is a community of *karmic seeds* brought forward into the present in the first phase of the episode. It is either a *temporal community* or a *shared-characteristic community,* or a *system.*

Context

A context is a group of previously-experienced *things* in terms of which an individual thing takes on meaning or becomes understandable (see *Understanding*). The context is itself a thing of which the individual thing becomes an integral part. The part is the way it is and behaves the way it does because of its place and function in the thing or context in which it is placed. With thought things, contexts are concepts. A context is a dynamic, living *system.*

Deformation

This term is used in a technical sense in this book to refer to changes in the *form* of the *primordial theme* that informs a *thing* (*physical or thought thing*) which are possible without it ceasing to be that particular theme.

Description

A description is an account of a *thing* by means of words, geometrical diagrams, or models, or a drawing. There are two types of descriptions. In one the parts of a thing are identified to the extent possible and the relationships among them described. In the other type the place and function of the thing in the larger thing of which it is a part is described. A model may be static, that is, describing the thing at a given time, or dynamic, describing similar things over successive experiences in a *temporal community.*

Detached participant

When the *I* is able to participate in an *experience* as if it were a part of that experience while at the same time *knowing* that it is not, it becomes a detached participant in the experience. It witnesses the experience as well as witnessing itself participating in it.

Event

An event is the appearance of a *thing* in an *experience*, or a series of things in a *temporal community*. Examples of the latter are the rising of the sun and the flowering of a daisy.

Existence

In general to exist means to 'stand forth' as a discrete individual – an entity. The 'standing forth' of an *experience* and the *I* to which that experience appears is against the backdrop of pure *awareness*. Because of this their existence is not absolute, but derives from or depends upon that of pure *awareness*. Ultimately therefore, only pure awareness, or *That Which Is* exists.

Explanation

An explanation is a *description* of the second type, that is, a description of the place and function of a *thing* in the larger thing that subsumes it. Why a thing is what it is and does what it does is made clear by this description.

Experience

An experience (noun) is the result of the interaction of an experiencing *subject* and an experienced object (*thing).* At the same time the experience is created, the subject comes to *know* the object. This 'coming to know' (see *knowing*) is *experiencing* (verb).

Experiencing

This is a process by which an *experience* is created. It occurs in three phases. In the first phase selected *Karmic seeds* are gathered up by the *subject* of the new experience in – the making. In the second phase the gathered up Karmic seeds are processed into a novel new experience. In this process a selection of some features of the gathered - up seeds is made and these are melded into a new experience. In this medling the promordial themes of the selected features are deformed (see *Deformation*) to varying degrees. Also, some features are given prominence in the new experience and

some are relegated to the background. The selection of *karmic seeds*, the selection of various features of these seeds, and the deformation of the primordial themes of these features are done so that the final experience conforms to the requirements of the causal agency at that point in time. In the third phase the subject becomes identified with the newly - created experience; that is, it seeds itself as part of the *thing* in the experience. This is termed the satisfaction stage of the eposode of experiencing.

Fact

The appearance of a *thing* in an experience is a fact. It is undoubtedly the case that the thing appears. Things appearing in waking and dream experiences and in insights (see *Insight*) are all facts.

Form

For an adequate understanding of the concept of form it is necessary to refer to Aristotle's twin notions of 'substance' and 'form'. The former is what is given form – an experience. What gives it a discrete and novel identity is its form. This form is what is required of the new experience in order to conform to the configuration of the *causal agency* at the *time* the experience is being created.

I

The I is the *subject* in all experiencing, the *I* who experiences (see *Experience).* When an experience appears the I considers itself to be a part of the experience that appears; that is, it identifies itself with the body of a particular *Homo sapiens*. This identity is a *person.* It is, however, possible for the I to witness the experience while at the same time being involved in it, in which case it is termed a *detached participant.* Ultimately, the I, as well at the thing experienced, are only *That Which Is.* When all experiencing (waking, dreaming and deep sleep) ceases, the I and what it experiences subside into That Which Is.

Insight

In this book an insight is exactly what the name implies: a glimpse of what lies under the surface of phenomena. It is a glimpse of some one or more of the *primordial themes* which give form to those phenomena. Insights are of various types: intuitions, waking and dream visions and auditions, and visions and auditions that occur in the states between sleep and waking, and waking and sleep.

Integration

This is a process in which a *thing* congnised in an *experience* is, in a subsequent experience, placed in a *context.* In other words, it becomes a part of a larger thing, playing a definite role in the structure and functioning of that thing.

Intuition

An intuition is a formless *insight.* It acquires form as a physical, thought, or emotional *thing* in subsequent experiences (see *Experience*).

Karmic seed

A karmic seed is of an *actual existent* in the past. It can be brought forward, or, more correctly, its *form* may be brought forward, to participate in a fresh episode of experiencing (see *Experience*). In this way the past enters into the present. Karmic seeds are stored in the archives of the *causal agency.* It is termed a 'seed' because it is a living, though for the time being dormant entity.

Knowing

To *experience* a *thing* is to know it. The thing known is known completely and certainly – it is a *fact.* The *I* who comes to know the thing may consider itself a *person,* or a *detached participant.*

Learning

Learning is a process in which a *fact* is placed in a *context* – either an existing context, or one newly constructed by the learner – in which it takes on meaning, or is seen to 'make sense'. When this is successfully done, the fact is understood (see *understanding).*

Life

Life is the energy that powers the creative outflow which culminates in an *actual existent,* and sustains it throughout its career. This energy is primordial and is not to be thought of as an attribute of an actual existent.

Logical

A statement or proposition is logical if it does not contradict itself in whatever situation it may be used. A *system* of statements or propositions is logical when none of the individual statements or propositions contradicts any of the others.

Markers

A marker is a constantly-appearing, readily-identifiable feature of a given phenomenon, or in other words a part of a *thing,* in a *temporal community.* Tracking several such markers and the relative movements among them over successive appearances of the thing in the temporal community is the basis for describing (see *description*) the thing. ('Relative movements' is to be understood in geometrical or logical terms.) The purpose of description is to discover, if possible, the more-or-less constant pattern in the structure or *form* of the thing, or what is termed the *primordial theme* informing it, and the ways that theme deformed over time.

Perennial questions

These are questions of the utmost generality which in all cultures and cultural ages people have asked themselves and have had to answer. They are three in number: who am *I*; what is the nature of my *experience*; and, what is *real.* The answer to the second is composed of answers to the following sub-questions: what finally, actually exists (see *actual existents)*; what are *life, space, time, causation,* the *subject* of an *experience*, and *knowing.*

Person

The *I* in a human *experience* is a person when it is identified with a part of the thing, the body of a particular *Homo sapiens* being experienced. It considers itself to be only that part.

Potential

An *experience* is created by the interaction of a *subject* and an object. In principle they must exist before an experience can come into *existence*. Their prior existence is termed the Potential. It is conceived as being present in *That Which Is*, but logically this is untenable. It has, however, the sanction of *insight*, and a decision has been made to over-ride logic in this matter.

Primary concepts

Primary concepts are answers to the *perennial questions*. These answers are based on that class of *facts* termed *insights*. Secondary concepts are derived from these primary concepts by deduction.

Primordial themes

The forms (see *Form*) of *things* are determined in outline by the abstract organising principles or primordial themes inherent in the *causal agency*. Examples are numerical themes (numbers as Pythagorean geometrical units, as duality, seven-foldness, and so forth, as symbols, and as ratios), musical notes and colours, pairs of opposites, psychological themes, and abstract themes like beauty, justice and fate.

Process

A process is a series of events aimed at achieving a certain definite end.

Protocol

A scientific protocol is a set of general guidelines for conducting scientific research derived from the *system of primary concepts* prevailing in the culture or cultural era in which particular scientists work. Following such guidelines ensures that the results of research will be accepted as valid scientific knowledge. These guidelines are usually not articulated as definite propositions, but are embodied in model research projects and programmes.

Real

There are three criteria of reality: 1) what is real requires nothing but itself to *exist;* 2) what is real always exists; and 3) what is real is always the same. In terms of these criteria *experiences* (see *Experience*) are not real since they have a beginning, *exist* in two modes and require the *subject* of an experience to exist. Only *That Which Is* is real. Experiences may, however, be considered dependently real since they depend on what is real, *That Which Is*, for their appearance. There are two orders of dependent reality. Experiences in the now are said to be manifestly real. As *karmic seeds* in the past they continue to exist, but are not manifest; that is to say, they are not present in the now of current experiencing.

Science

Science is the systematic study of phenomena. In general it involves observation, *description*, *explanation,* prediction and testing. How these are done is determined by the scientific *protocol* agreed to by scientists, and this, in turn, by the *system of primary concepts* prevailing in the culture/cultural era in which the scientists pursue their work.

Shared-characteristic community

This type of *community* is an *integration* of *things* that are similar in form or have the same *primordial theme.*

Space

Space is a *system* of relationships among the parts of physical *things*. These relationships are described in terms of the distances between the parts and the direction of one part from another. More

fundamentally, it is what individuates a thing, makes it a distinct thing apart from other things, Space comes into operation only within an *experience*.

'Story'

In Plato's dialogue *Timaeus*, Timaeus explains that the *system of primary concepts* he is presenting, like all such systems, is tentative, no more than a 'likely story'. The individual concepts making up the story must be tested in practice by formulating contexts (see *Context*), and then making predictions from them. The term 'story' is used in this book as a convenient short-hand expression for *system of primary concepts*.

Subject

Experiencing (see *experience)* is the interaction of a subject and an object. The subject or *I* cannot be an object of experience, but in its desire to be something definite, identifies itself with a part of the object (*thing)* experienced. In a human experience it becomes a *person*. When the I becomes aware that it is not really that person, he or she becomes a *detached participant*, continuing his or her role as the person but at the same time witnessing itself acting that role.

System

A set of *things* working together to form a self-defining, self-organising and self-maintaining, living entity is termed a system. All things and *integrations* of things are systems.

System of primary concepts

A complete set of answers to the *perennial questions,* when fashioned into a *logical* and *coherent system* is termed a system of *primary concepts,* or more simply a likely *story.* It is the basis and rationale for all those ways of thinking about themselves and their affairs that characterise the people of a given culture or cultural era.

Temporal community

In a temporal *community* of experiences (see *Experience*) the individual members are similar to one another and follow one another to form a logically connected series, the series as a whole making up a single experience in the now. This single experience gives rise to a sense of a single enduring *thing*, and to a sense of *time*.

That Which Is

The backdrop against which *experiences* also (see *Experience*) appear is termed That Which Is. It is pure, content-less *awareness.* It alone is *real.* It alone exists (see *Existence*).

Thing

A thing is what appears in an *experience.* There is only one thing in each experience. All things are composed of parts and are in turn parts of larger things. From the former point of view a thing is also a *context* as it makes each of its parts intelligible. The terms 'thing' and 'context' are used interchangeably, highlighting one or the other of its aspects in any particular situation. A thing is what actually exists (see *actual existent*), a *fact.* It exists in one of two modes: as an object in an experience and as a *karmic seed* in the past. There are four types of things: physical, thought, emotional and feeling. Things appear in waking and dreaming, and in *insight.*

Time

A sense of time is created by the appearance of a *temporal community.* This sense is heightened by the changing spatial relationships of the parts of a physical thing in the successive experiences that make up a temporal community.

Understanding

A *fact* or *thing* is understood when it is placed in a *context* in which it acquires meaning in relation to other things. A context is a larger thing of which the thing under consideration is a part; when its

place and function in the larger thing are described and then explained in terms of *primary concepts*, the fact is understood. (*see* Description and Explanation)

Way, the

'The Way' is a short-hand expression for the longer expression 'things are the way they must be'. It is also short-hand for the more formal expression the common, unitary causal agency or *causal agency.*

World context

A world context is a high-level, indeed the highest-level, public *context* created to describe and explain *things*. For a given species of organism, the world contexts of all individuals are similar, creating the impression that there is a single common world 'out there' in which all members of the species live.

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